

917.3 M94y

Keep Your Card in This Pocket

Books will be issued only on presentation of proper library cards.

Unless labeled otherwise, books may be retained for two weeks. Borrowers finding books marked, defaced or mutilated are expected to report same at library desk; otherwise the last borrower will be held responsible for all imperfections discovered.

The card holder is responsible for all books drawn on this card.

Penalty for over-due books 2c a day plus cost of notices.

Lost cards and change of residence must be reported promptly.



Public Library
Kansas City, Mo.

Keep Your Card in This Pocket

KANSAS CITY, MO. PUBLIC LIBRARY



0 0001 0158372 2

BR

BARBERS OF

MO

1943-1944

DEC 16 '43

JAN 17 '44

FEB 14 '44

JUN 20 '44

JUN 28 '44

21a

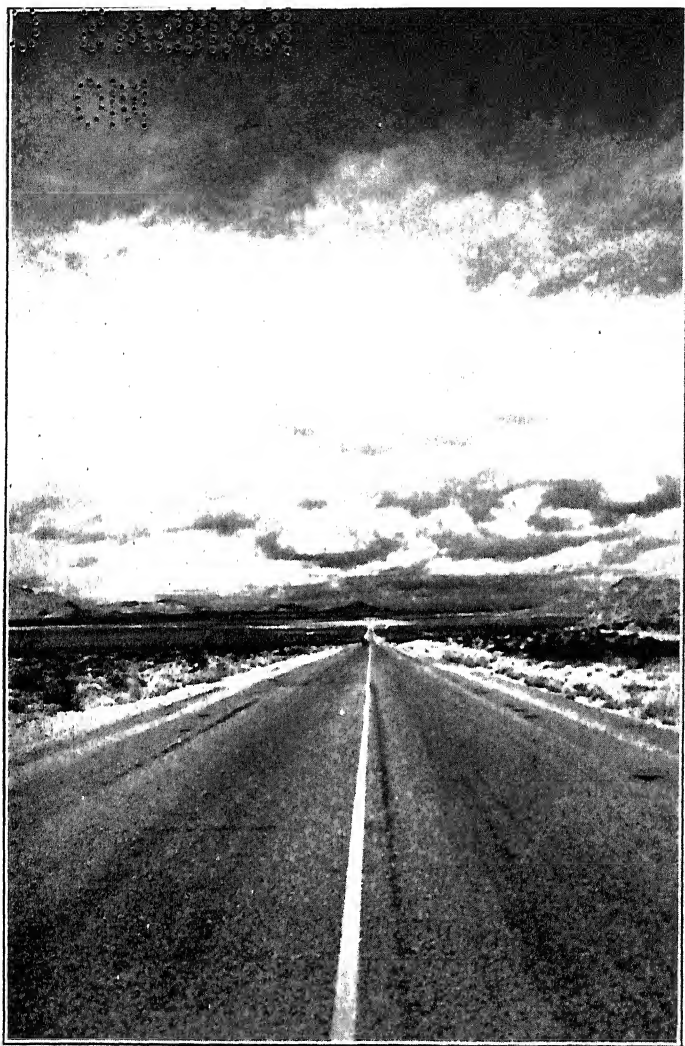
AUG 13 '44

JUL 19 '44

AUG 13 '44

38

Years of This Land



Land of long distances and few people.

YEARS OF THIS LAND



*A Geographical History of the
United States*

BY

HERMANN R. MUELDER

AND

DAVID M. DELO



D. APPLETON-CENTURY COMPANY

INCORPORATED

New York

London

1943

Copyright, 1943, by
D. APPLETON-CENTURY COMPANY, INC.

All rights reserved. This book, or parts thereof, must not be reproduced in any form without permission of the publisher.

TO

Annie and Sunny

Acknowledgments

THE writers wish to express their deep appreciation to Dr. Kirtley F. Mather for reading and criticism of the manuscript of this book, and for his encouragement during the months of arduous and often discouraging preparation.

The illustrations came from many sources. Thanks are extended herewith to the Union Pacific Railroad for use of illustration facing page 193 and the view of the Grand Tetons opposite page 103. The United States Soil Conservation Service courteously furnished the views of misused and properly farmed lands opposite pages 168 and 169. The Nevada State Highway Commission supplied the frontispiece, a panorama of desert landscape, and the United States Bureau of Reclamation contributed the picture of Boulder Dam opposite page 192. The aerial view of a Corn Belt farm near Galesburg, Illinois, facing page 22, was taken by Perry Gliessman; that of the Limestone Valley of Virginia, opposite page 23, by George A. Grant, United States Department of the Interior.

The maps on pages 3, 20, and 25 are used by permission of Dr. Carey Croneis and the Chicago University Press from "Down To Earth," by Croneis and Krumbein.

H. R. M.
D. M. D.

Contents

CHAPTER	PAGE
1. "THY ROCKS AND RILLS"	1
2. "THROUGH THE MIST OF THE DEEP"	35
3. "I'LL TAKE MY STAND"	56
4. "LET ALL THAT BREATHE PARTAKE"	76
5. "THE TWAIN SHALL MEET"	90
6. "WHAT THEY WASTED EVERY DAY"	116
7. "HARD TIMES COMES A-KNOCKING"	158
8. "STARS IN THEIR COURSES"	195
9. UNMANIFEST DESTINY	218
INDEX	239

Maps

	PAGE
The glaciers covered half of North America . . .	3
Ancient seas spread across America from these troughs before they became mountains . . .	20
The Appalachians are no longer young, but the Rockies still preserve their figure . . .	25
Distribution of mountains, plains, and deserts in the United States . . .	33
Did these pieces once fit together? . . .	37
Circuit of wind, water, and commerce in the North Atlantic . . .	40
Diagram of the geographical situation of the United States immediately after the Revolu- tionary War . . .	65
Expansion of the Cotton Kingdom . . .	73
The country traversed by the Oregon Trail during the first years it was used . . .	101
A translated map of the United States . . .	113
How state laws regarding twenty-ton trucks carve up the Union . . .	199

Photographs

Land of long distances and few people . . . *frontispiece*

FACING PAGE

A Corn Belt farm . . . "silos taller than the farm-houses"	22
The Limestone Valley . . . southward pathway for early pioneers	23
Fort Laramie . . . hereafter the trail was rougher and steeper	102
The Tetons . . . "glaciers gnawed at their flanks" .	103
Early copper mine, Lake Superior District, 1850 .	148
Mining a mountain of copper at Bingham, Utah .	149
"Desolation to a region as large as many kingdoms"	168
Beautiful, useful, and preserved for posterity . .	169
Boulder Dam . . . venture of to-day—preface for to-morrow	192
"Beautiful in the warm sunlight"	193

Years of This Land

CHAPTER ONE

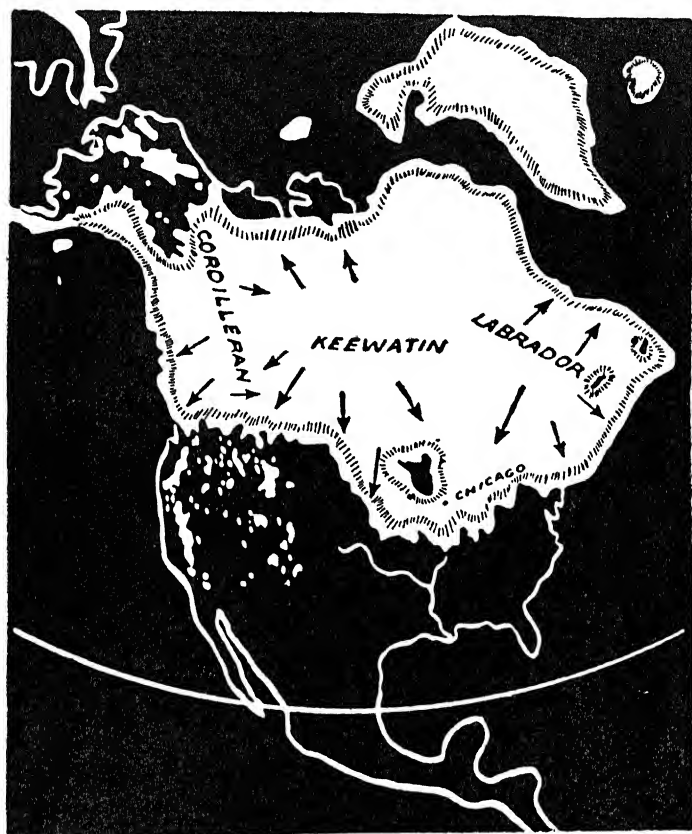
"Thy Rocks and Rills"

NORTH America lay broad and beautiful in the warm sunlight. But the warmth soon fled. The snows came thickly, and far to the north, the ice-sheets gradually piled higher. Four times in the million years between then and now they grew, and melted, and grew again. In Canada and Labrador their centers were two miles or more thick. The land groaned and bent beneath their weight. Slowly the ice pushed southward, spread by its own weight as tar flattens in the sun. Howling shrilly about its border were chill winds, which blew from the glacier on to the surrounding land. The rock and earth beneath were scratched and gouged into new contours. When the glacier had gone, it left behind an irregular mixture of clay and sand and rock, scattered as though a host of giant dump-trucks had spilled their burdens helter-skelter across the landscape. Water from the melting ice filled the irregularities in this surface and formed widespread lakes and swamps. The land took on a new form; the facial surgery of the continent was done.

The first two glaciers left little trace on modern

topography. During the period of warmer climate which followed their retreat, running water carved great creases in the new face of the land. Moreover, most of the area covered by the older ice-sheets was later invaded by two more glaciers. The earlier of these, the Illinoian—named for the state where its deposits were most distinctly developed—moved out from Labrador, and produced the great festoons of morainic hills which extend from Long Island to the Ozarks. After its withdrawal, which was followed by a period of warm weather, the Wisconsin ice-sheet advanced from the region of Hudson Bay. First it flowed westward and southward into Iowa, then retreated somewhat, only to move again southward through the valley which is now Lake Michigan. It finally halted near Bloomington, Illinois. About the same time, another tongue of the Wisconsin ice-sheet forced the Ohio River southward to its present course, and added its load of sand and boulders to the crest of Long Island. This was the final maximum of the glaciers.

Ever since that day they have faded in power, although their retreat has been fraught with many pauses and occasional local advances. In their heyday they covered almost half the continent. A sinuous line drawn from Long Island to Pittsburgh and down the Ohio, thence around the northern flank of the Ozarks and up the Missouri, marks their southern limit. The Ohio and Missouri were forced from old valleys which are now filled with glacial deposits.



The glaciers covered half of North America.

Their present courses very nearly follow the former margins of the ice. North of this line, a vast glaciated plain extends from the Alleghenies to the Missouri River. Its rich black soil owes its virility to the fresh

and finely ground minerals in the ice deposits. Covering much of this plain is a layer of loess, fine fresh rock fragments blown from the sand-bars of overloaded glacial rivers. This was to be the Corn Belt, the bread-basket of a continent, fashioned beneath the frozen coverlet of the glacier.

At the junction of the boundaries of Illinois, Iowa, and Wisconsin, is a small region around which the glaciers detoured. Still preserved there, surrounded on all sides by ice-laid material, is a pre-glacial land surface. This shows that before the Ice Age the Middle West was a land of hills and valleys, unfit for the type of agriculture which has made it flourish.

The glaciers cast a different rôle for New England. There the ice rode a mile deep and covered the crests of the mountains. The crystalline rocks were so resistant that the deposits left by the melting ice were mostly sand and boulders instead of soft clay. Except for a few small soft-rock pockets, the brown granite hills of New England were left naked, or thickly strewn with scratched and rounded rocks. When streams resumed their flow, they brawled down new boulder-strewn courses and leaped headlong over irregularities in their valleys. The ice in this way shaped two contrasting destinies: the soft rocks of the Middle West formed a rich level plain; the hard barren hills of New England made farming unprofitable but created water-power in great abundance.

Before the Ice Age, large areas of the north-central

Middle West were covered by soft shales. Doubtless wide shallow valleys had been carved in them by streams before the ice came. The glaciers gouged deep in this unresisting rock and, as they retreated, lay long stagnant in the valleys they had deepened. While the ice melted slowly northward, water filled the southern ends of these depressions and drained to the nearest rivers. Lake Superior flowed down the Mississippi, Lake Michigan drained out through the Illinois, and Lake Erie into the Wabash. Water lay sixty feet deep over Chicago, and its waves carved cliffs along old shores twenty miles to the southward. Travelers along U. S. Highway 20 follow one of those ancient shores. When the ice withdrew even farther, a lower outlet opened through the St. Lawrence Valley, and the level of the lakes fell. But ice had bent the earth's crust far below sea level. When the melting of the glaciers finally freed the St. Lawrence from its icy covering, salt water rushed in from the North Atlantic to form a land-locked sea similar to the Baltic of to-day. Its shores lay as far west as Lake Ontario and extended southward through the Champlain Valley. Soon the earth began to rise to its normal height even as a rubber ball which has been dented returns slowly to its normal spheroidal form. So the silts of this old Champlain Sea now lie hundreds of feet above sea level. Areas in northern Canada which had been depressed by heavier ice rose even higher. Scandinavia, previously at the center of the European glacier, lifted

a comparable amount. Careful annual measurements show that the uplift still continues.

As the waters of the Champlain Sea returned slowly to the Atlantic, the Great Lakes were revealed as they are to-day: Superior, Michigan, Huron, Erie, and Ontario. Half the fresh water of the world, they cover more than ninety thousand square miles to form the greatest inland waterway on earth. Almost a thousand miles lie between Duluth and Buffalo, with the iron of Mesabi at the northern terminus and the coal of the Alleghenies at the southern. So did geologic circumstances provide a cheap and easy way to join the two essential materials of a mechanized civilization.

There were two geological events which now assist greatly in estimating the lapse of years from that time to the present. These occurred while the ice faded into extinction across Canada. A new tributary of the northern Mississippi formed a sheer cascade where it tumbled over steep cliffs of sandstone near the present site of St. Paul. Father Hennepin, intrepid priest-explorer, who named it for St. Anthony, found the waterfall several miles north of its original position. The falling water, cutting gradually upstream through the sandstone, furnishes an accurate calendar of the ages. If it be granted that the rate of retreat has been fairly uniform, it is then a simple matter to divide the total change in position by the annual rate of cutting to find the length of time which has elapsed since the falls began. This

arithmetic suggests that St. Anthony's has been flowing for more than twenty thousand years. The figure is substantiated by similar data from Niagara Falls, which has retreated some seven miles upstream since water first overflowed eastward from Lake Erie.

Hence, geologically speaking, the North America which man has known came only yesterday. As the climate warmed for the last time, vegetation was re-established across the glaciated plains and mountains. New streams flowed down new slopes, rounding the angular glacial terrain, draining the swamps, and filling the little lakes with sediment. The horse and the mastodon were disappearing. In their place, herds of shaggy buffalo followed the vegetation northward. The continent they grazed across was fresh and new and strong. Its forests covered millions of square miles. Its vast prairies were fertile; its climate was beneficent. Locked in its bosom lay all the sinews of peace and war for which ambitious men could wish. Forty per cent of the world's coal, vast iron deposits, unnumbered pools of oil and gas lay beneath its surface. The mountains were honey-combed with rich deep lodes of gold and silver, copper, lead, and zinc. But there was no one to use them. No miner's pick had scratched, no plow had furrowed, no hunter's trail had marked the continent.

Even as the buffalo spread northward in the wake of fading ice, men first felt their way cautiously across America. They came southward through a

gap in the glacier beside the eastern face of the Rocky Mountains. The corridor they followed twenty thousand years ago connected the Great Plains south of the Missouri with lowlands bordering the Bering Sea. The latter area was never glaciated, and the western edge of the Plains was then rather dry even as it is to-day, because it lay in the lee of mountain ranges that robbed the moisture from prevailing winds blowing off the Pacific. These first human invaders came from Asia across a Bering Strait narrower than now. From the lowlands bordering the Strait they worked their way southward along the Mackenzie River and followed the eastern mountain base into the northern part of the United States. They hunted not only the modern animals with which we are familiar but also encountered the last of the vanishing elephants and horses.

After the first arrivals had moved into the heart of the continent, a slight advance of the ice-sheet partially closed the pathway behind them, holding back those human beings still in the north. The earlier migrants meanwhile dispersed toward Mexico and the Mississippi Valley. Then the glacier began its final retreat, and a greater uninterrupted migration began again along the old as well as new pathways.

Definite differences in culture were brought by these ancient Asiatics. To these were added new peculiarities formed under strange conditions in widely separated places. These Indians divided into many tribes and spoke mutually unintelligible lan-

guages. The life of most remained very primitive. But practically all living in North America were eventually to share more or less common cultural traits, traits most likely acquired from the highly civilized Indians of central and southern Mexico and adjacent Guatemala.

There, by the time of Christ's birth, the Mayas had developed a way of life comparable to those Near Eastern cultures which cradled the civilization of Europe. City states with a communal or coöperative form of society created graceful sculptures, beautiful buildings, and copious carvings. Even now, after years of study, their remains are still a subject of marvel and much mystery. The Mayas constructed what they did without metal tools, draft animals, or even such elementary machines as the wheel. Yet they did not lack inventiveness. In their time they carried the study of astronomy farther than any contemporary people. They likewise perfected an arithmetic more efficient and far less unwieldy than the system used by Greek philosophers, by Roman tax collectors, or by North European scholars as late as 1,000 A.D.—when the Norse first discovered the more primitive Indians north of Cape Cod.

The civilization that succeeded the Mayas did not acquire their creative capacity. But it did incorporate many of their achievements into a highly systematized Indian society that existed on the Mexican plateau during the last centuries of the pre-Columbian era. On the north, near the Colorado River and

along the upper Rio Grande Valley, pueblo civilizations flourished, and perished, and flourished once more. All were indebted, however indirectly, to Mayan inventions. Less obvious but still evident are signs that the culture of the "mound builders" of the Mississippi lowlands was a distant expansion of artistic, religious, and social traits that had skirted the warm shores of the Gulf of Mexico in their northward passage. Even when the Indians dwelling by the middle and northern tributaries of the Father of Waters failed to live up to this high heritage, they retained many of its features, however much they misunderstood, adapted, or changed them.

Greatest in the common heritage of the historical Indian was the gift of maize. From where did it come? Some Indians believed that it was delivered to a poor and lonely man by a beautiful maiden whose long light hair still grows as the silk which crowns the ear. More likely it was developed from a wild ancestor by the Indians of Central America, who domesticated it so thoroughly that it can no longer grow at all without human intervention. No plant-breeding job in the world is so remarkable as this one. The Indians produced diverse strains so well adapted to differing environments that they can grow not only along the subtropical shores of the Gulf of Mexico but also in the rarefied air of the Peruvian Andes, twelve thousand feet above the sea. Maize germinates in semi-arid New

Mexico where the Hopi must plant seed a foot deep to secure sub-soil moisture, yet it also matures in the short growing season of Canada.

So numerous were the adaptations developed, that to-day this "Grass of the Gods," as certain Indians called it, is more widely grown over the earth than any other cereal. White men receiving this food for the first time gave it the word they hitherto had used for all grains in general, the inclusive name of *corn*. Improvements bred in it by modern scientists are slight compared with the primary achievements of the Indian horticulturists who preceded them.

Within the obtuse triangle formed by the Ohio Valley and Missouri River lived Indians of Algonquin stock who nurtured corn not nearly so well as their more advanced neighbors east and south. It remained for the white men to make this into the Corn Belt. For maize flourishes in this region's fresh glacial soils and its hot humid summers. And while Indian corn is grown to some extent in every state and in parts of every continent, there, in the Middle West, is now a corn culture of which men dream and scheme and despair, or hope and sing. Green, checkered spring fields revealing new patterns with each flick of the eye, are head high by the end of July, closing off the vistas of prairie distances. Soon they stand like a dense jungle in which children may be lost. Their tough stalks, last and hardest of crops to level, burn in long rows across the fields, lighting April evenings

with flickering yellow flames. Even then, the last fermented remains lie stored for cattle-feed in round silos taller than the farmhouses.

Roasting ears, prisoned in a gleaming can; flakes for breakfast, poured from a bright box; bourbon in brown bottles, curved for the hip; meal for hot-bread, straight from the pan; steaks from fat steers, corn-stuffed for killing; cobs in the barnyard to make a quick fire! Puddings from starches, yellow as sunbeams; oils for salads tossed in a bowl! Its future magic, who knows the answer? Only chemists can tell! This is the modern miracle of corn, standing sere and brown in the chill winds of November while picking machines chug down long straight rows.

The Indians who domesticated corn had one favorite subject of sculpture and temple decoration, a deity of peace, worshiped as the god-creator of their arts. He was white and bearded, and it was believed that some day he would return from the east whence he had departed.

In the year 1519 he did come, bearing the name of Cortes rather than the names the Indian nations had given him. But Cortes brought them death, and the mutilation of their civilization.

What that bearded Spaniard, who was human enough, found and seized, soon became a legend in itself; a legend of gold, the "offal of the gods," as some natives had called it, which quickly lured white men to disillusionment far to the north along the fringes of the Mississippi Basin. Coronado and

other pursuers of tall tales were to be followed much more slowly by mission-building priests, cattle-raising landlords, and tiny companies of soldiers. Their communities were sparsely scattered along the upper reaches of the Rio Grande even before the French and English came to stay along the sunken river valleys of the North Atlantic.

These white new-comers to the western portion of the continent found a land of broad grass-covered plains and rugged mountains. On to the east were forested plains, and even beyond were other lower and less rugged highlands. Separating the grass from the tree-covered plains was the muddy flood of the Mississippi. With its major tributary the Missouri, it formed the longest river system in the world. Along this margin between the forest and the prairies, groves of hardwood were interspersed with park-like savannas where grass grew head-high to a man. To the north these gave way gradually to the pine and spruce of a more rigorous climate. Eastward the plains broke abruptly into the rough hills of the Allegheny Plateau country; to the south they gave way to the sink-hole studded highlands of Kentucky. The Alleghenies dropped precipitously to the Valley and Ridge region, where folded rock layers, now hard, then soft, lay alternately high and low. Then across the Limestone Valley rose the Blue Ridge, which loomed like a wall above the rolling lowlands sloping eastward toward the Atlantic.

Far to the south, men could travel easily over forested plains around the southern end of the Appalachians; far to the north, the St. Lawrence formed an easy route into the heart of the continent. Between was only a single uninterrupted pathway, where the valleys of the Hudson and the Mohawk, following a belt of soft rock worn low between the rugged Adirondacks and the rolling Catskills, led from the Atlantic Coastal Plain to the shores of the Great Lakes.

This is the sea-level route: in fact, the Hudson is tidal as far as Albany, where the Mohawk joins it at right angles. They both flow in an old trough that drained the Great Lakes in those not very distant centuries when the ice still choked the St. Lawrence. A little farther north the Hudson comes within ten miles of Lake George, which together with Lake Champlain still marks another such spillway which once emptied south by way of the Hudson rather than, as to-day, northward into the St. Lawrence. The strategic significance of this forked road through the highlands is obvious. As a consequence of it, more fighting has occurred here than in any other part of the United States. The British used it to invade French Canada in the imperial wars of the eighteenth century. The Americans used it to march against British Canada in the American Revolution and again during the War of 1812. The grand strategy of the British during the Revolution called for the advance of two forces along the two valleys. At

Albany they were to join a third army marching up the Hudson. It was the definite frustration of this scheme that made the battle of Saratoga (near Albany) the decisive conflict of the war.

Buried in the deep heart of the ragged low plateaus south of the glaciated plains were two areas where soft shales and limestones had been worn into level-floored basins rimmed by sandstone-capped hills. One of them was to become the Blue Grass of Kentucky, the other the Nashville Basin of Tennessee—both islands of rich soil and smooth grassy pasture in the midst of rough tree-studded hills and valleys. Their soils were to determine the stopping-places of many limestone-conscious pioneers who would some day work their laborious way down the Great Valley of the Appalachians before entering the heart of America. In fact, the first substantial American settlements west of the mountains were planted in these two basins.

Westward from the Mississippi the trees grew scarcer. They changed from elm and maple to the low willow and cottonwood, which clung to the eastward-flowing rivers. Between, like a whispering sea, lay the grass; millions of acres of grass, which supported the buffalo, wild cousins of domestic cattle, in hordes the like of which no other continent has known. Here for a thousand miles all the rivers rose in the distant Rockies and flowed eastward to the Mississippi. Only the Missouri, forced to reroute its valley around the edge of the ice sheets, turned

sharply southward for a long distance before bending again toward the Father of Waters.

Gently the land surface rose to the westward. Slowly the grass thinned and became shorter. The prairies changed from green to dusty brown. The little streams disappeared, replaced by dry, sand-choked washes down which waters roared infrequently, disturbing the lizards which had dozed in the sun for months on end. Even the larger rivers were choked with the sand, and flowed in winding shallow channels across broad, island-studded beds. Here and there hastening water had cut away the spare grass and washed out bewildering mazes of gullies or badlands in the soft silt. Littering their barren slopes were the bones of the dead: animals that long ago had browsed and grazed in lush lowlands along ancient rivers which had built the plains.

Then the Rockies rose like a vast cloud along the distant horizon. Their crests were snowy; glaciers gnawed at their flanks. Exposed around their feet, and standing almost vertical in long hogback ridges, were rock layers once laid on the floors of ancient seas and buried thousands of feet down beneath the plains. The same age-old granites that lay deeply concealed beneath the Mississippi formed the crests of the highest peaks. Cunningly hidden in their bowels were materials of great richness and great usefulness.

But the Rockies were only the beginning of the mountains. For more than a thousand miles west-

ward the land was built of peak and cañon. In the vast desert between the Wasatch and the Sierras, bare rock ranges sailed like ragged ships of the line through alkali-whitened flats. Here the crust of the earth had broken into segments, of which one fell, another rose, alternately for hundreds of miles. Far to the southwest Death Valley, fallen the deepest, rested far below sea level. There was little rain in this land. The barren rocks supported few trees, and the wide gravel-strewn basins between the ranges bore only cactus and greasewood. It was no land for men who wished to till the earth.

Walling it off from the moisture-bearing winds of the Pacific towered the bold face of the Sierras. They had hunched upward, a little here, a little there, to become the highest mountains in America. Much of their substance, washed from their western slopes by abundant rain and snow, had filled the Great Valley to the westward with silt on which men now grow the fruits of the tropics.

Far to the north, energized by the same earth deformation which lifted the Sierras, the Cascade volcanoes marched in a single cosmic file. Once their shapely lava cones spewed fiery smoke and ashes; now their senile brows sprout gray glaciers, testimony of approaching oblivion. Only Lassen Peak still speaks occasionally in muffled grumbles of their youth.

This is the land men saw then. They saw it as the laws of Earth and geologic chance had created it.

The wild horse and the mammoth were gone; the buffalo and the deer and the elk were in their glory. But the horse and the white man were to dethrone the buffalo. The horse and the white man and the oxen were to break the tough turf of the prairies, tear down the forests, and seek avidly the riches of the mountains: the horse and the white man and the oxen and the iron horse, changing the pristine face of America.

This was a land filled with surprises—such a variety of surprises that before long men dared believe in unbelievable bonanzas; grand surprises, such as only high-handedness, munificence, and long geologic time could prepare, whose secrets only the geologist, working through the years, could decipher.

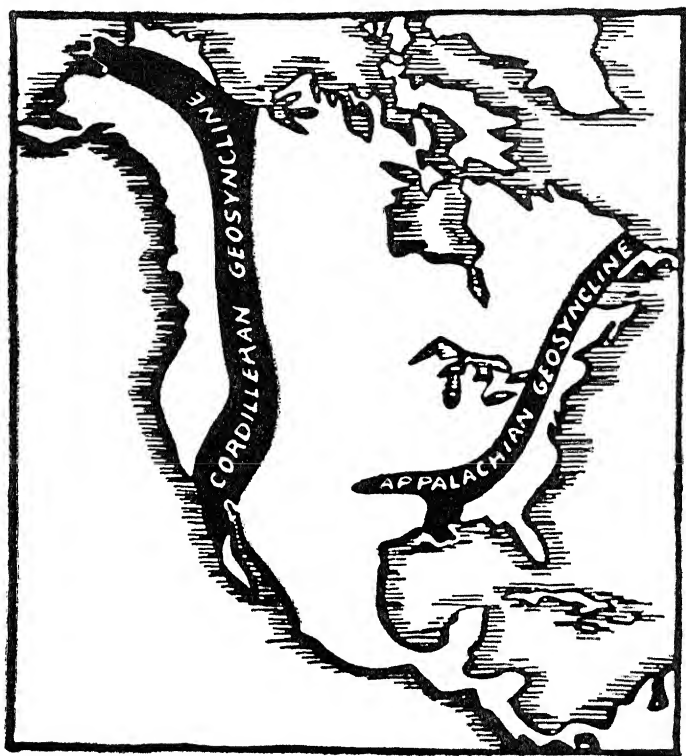
Out of the side of Mount Rushmore the craggy face of Borghlum's Lincoln looks from the Black Hills over the plains, great platter of the continent. The man is old, as heroes are, made of stuff from the ages when gods dwelt among men. His head is carved in stone which has endured for more than a billion years. The granite is old, old and strong, the most abundant rock in the earth's hard crust. Everywhere beneath the thin skin of softer strata we find it—in some places buried miles deep, elsewhere forming the crests of tall mountains. Not all granites are so old: a few are young, but most date back to an ancient part of geologic time.

This granite was once a red-hot mass far down

beneath the earth's surface. Associated with it were hot liquids that separated from the pure granite while it cooled, and flowed under terrific pressures into the cracks and pores of the rocks roundabout. The fiery fluids sometimes carried gold. Now, only a few miles from Mount Rushmore, men burrow more than four thousand feet to mine it. At Sudbury, in Ontario, the hot liquors left the nickel used now to armor-plate our battleships and toughen the cog-wheels of industry. In a thousand more mining-camps, other men dig and toil for the spawn of once molten rock.

Even while the ancient granites were cooling, a land-locked sea invaded the region of Lake Superior. Its acid waters harbored myriads of tiny bacteria. Each of these, in its peculiar living-process, gathered iron from the water and deposited it on the ocean floor. This year, a million years later, giant shovels gnaw ninety million tons of ore from those same age-old strata. Thus the world's greatest iron deposits were created by microscopic bacteria.

Throughout the earth, the ancient rocks form a great treasure-house from which men have taken untold riches. The early little-known period when they were formed included about three-fourths of the two billion years geologists have allowed for the earth's history. North America has experienced many changes since that era: mountains have been lifted and worn again to level plains by the incessant gnawing of wind and ice and water; seas have spread from



Ancient seas spread across America from these troughs before they became mountains.

tropic to arctic; palms have waved where now are frozen oceans; widespread swamps have mothered coal; glaciers have accumulated and melted away.

The second era included about one-fourth of geologic time. Shallow seas ebbed and flowed almost ceaselessly across the continent to deposit layers of

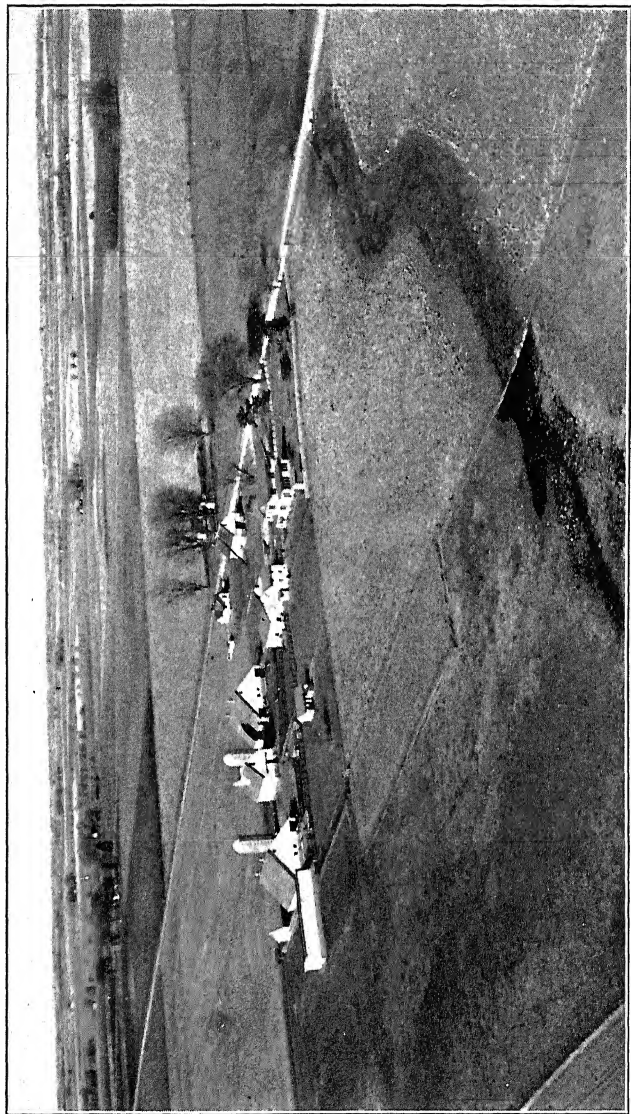
mud which hardened subsequently into rock. The invasions of these seas usually followed two main depressions which lay, odd though it may seem, where the two major mountain ranges are located to-day. The seas often overflowed their margins and sometimes covered as much as two-thirds of the continental surface. The floors of the two major seaways sank slowly beneath the weight of the sediments washed into them from adjacent highlands. During early inundations, limestone was deposited almost exclusively in the eastern depression. Slight up-and-down movements of the land later caused this type of deposit to change to sand, then mud, then lime again. After gigantic horizontal pressures had crushed the eastern seaway until it became the Appalachian Mountains, running water wore away the crests of the rock folds, left the hard sandstones standing as ridges, the soft mudstones and limestones as valleys. Because the land was lifted most along the eastern side, the oldest rocks are exposed there. The early-formed limestones now floor a long corridor, the Limestone Valley, which extends without interruption the length of the Appalachians. Here was a smooth southward pathway for the early pioneers from the east, discouraged from westward penetration of the virgin continent by the rough and almost impassable Alleghenies which lay athwart their road to the rich interior plains.

This first lifting of the Appalachians forced the seas to retreat, but only after thousands of feet of sand and mud had filled the subsiding seaway. Inter-

bedded between the limestone was iron ore, a great layer of it, thickest at the southern end, but extending down the folded ridges from New York to Alabama. In the belching blast furnaces of Birmingham, which now metamorphose it to steel, coal from the same area furnishes the heat, while limestone draws away the dross which impairs its usefulness.

The seas likewise withdrew from the Central States. The fossils prove that the rock layers they left were much thinner. Even so, sharks long swam freely where corn-fed cattle now chew their cuds. In southern Indiana, clearer, limpid waters, far from shore, lay over a floor of limy ooze composed of shells of millions of tiny animals. During the years it has hardened and crystallized, and the "Indiana limestone" now walls many a tall tower or hangs in the steel skeleton of many a skyscraper.

The broad exposed sea floors left by this withdrawal were covered by immense swamps, even as the Everglades now occupy that portion of the recently lifted Atlantic floor which we call Florida. Primitive vegetation grew lush in these steaming swamps. Giant dragonflies with a two-foot wing spread soared between the fern fronds, and the first of the reptiles slogged through the mud and water. For millions of years the tree-ferns thrived, and died, and grew again. Time after time the swamps were filled with sea water—in Illinois more than thirty times. Then the plant remains, preserved from decay by the stale, poisonous waters into which they fell,



Photograph by Perry Giessman

A Corn Belt farm . . . "silos taller than the farmhouses."



Photograph by George A. Grant

The Limestone Valley . . . southward pathway for early pioneers.

matted into thick layers of peat which were later transformed into seams of coal by the weight of overlying sediments during the broad expanse of geologic time.

Seas never again were to cover the Appalachians, although from time to time salt water lapped against their eastern and southern foothills. The vast forces which squeezed the Appalachian seaway to one-half its former width had come from the east. So the rocks are tightly folded near the Blue Ridge but are almost horizontal in the Alleghenies to the westward. Pressure great enough to compress ten miles of sediment also changed the physical character of the rocks. The soft mud rocks of Pennsylvania and New York became hard slate; the limestones slowly crystallized to marble. The coals hardened. Those of the Central States, farther from the great squeezing, remained unchanged; hence coal in Illinois is softer than that in the Alleghenies. The anthracite of northeastern Pennsylvania, caught in the center of the folded belt, underwent the greatest changes of all.

The genesis of the Appalachians was comparatively quiet, except in northeastern North America where volcanoes spouted smoke and lava. In Colorado and Texas, only local mountains were lifted. Seas still lay to the southwest and throughout the Rocky Mountain seaway, and were to roll intermittently across the Great Plains region from Mexico to Alaska for millions of years to come.

This succeeding middle phase of our history saw

the Appalachians worn to a level plain. The reptiles—dinosaurs in particular—were rulers of land, sea, and air. Tiny rodent-like mammals, future lords of the earth, cowered quietly in burrows, biding their time. Sea invasions gradually became less marked, and the water slowly withdrew. Again fresh-water swamps covered the exposed sea floors, this time in the Great Plains area, forming coal beds which now extend from New Mexico far into Canada. As the swamps filled, the Rockies rose, forming essentially the same geographic pattern which we see to-day.

As the Rockies lifted, new forces were manifest far down in the earth's crust. Once again molten granites formed miles below the surface. Their precious cargoes of metals once more were carried by hot liquors into the surrounding rocks. Then were formed the Mother Lode, the copper veins of Butte, the lead and silver of Cœur d'Alene, and the gold of Virginia City. Brewed in volcanic heat, they were to lie long cold before the fire of the smelter was to make them useful and beautiful, before, in their turn, they furnished the gleam which men followed to the conquest of the continent.

While the metals cooled, the muds of well-nigh forgotten seas settled and compacted. The animals and plants entombed within them were slowly squeezed to generate tiny droplets of oil. As the years passed, and compaction gradually closed the openings in the rocks, these droplets joined one another in the stronger, more porous strata. From Pennsyl-

vania to California, from Texas to Michigan, they gathered in pools, there to wait for the white man's drill and a fateful day in 1859.

No sooner had the Rockies started to rise than all the forces of erosion joined hands to cut them down



The Appalachians are no longer young, but the Rockies still preserve their figure.

again. Streams first attacked the crests and flanks of the mountains, filled the intermountain basins with mud and sand, and in many areas completely buried low ranges beneath them. Rivers deposited a sheet

of silt which extended hundreds of miles to the east of the mountains, gradually building the Great Plains. Land lay where the Bering Sea now surges, and across this isthmus traveled a never-ceasing two-way parade of animals. There went the three-toed horse to the plains of Asia. Soon he was to disappear from America, only to return long afterward with the white men. Thence came the elephants to graze the broad prairies of Nebraska and browse in the deep forests of the Atlantic seaboard.

But the earth was not quiet for long. There were world-wide stirrings. In all the continents the crust quivered, and lofty mountains were newly born or old mountains born anew. The Rockies shook themselves and rose a second time. Rivers at once began to cut away the soft silts deposited a short while before. The Appalachians were rejuvenated. Far to the west, the Sierras pushed upward, and between them and the Wasatch the crust crumpled. Molten lava, rising from riven rocks far down in the crust, poured in great floods across the land, to build the Columbia Plateau. A ring of volcanic fire circled the Pacific, and in America extended inland as far as Colorado. Meanwhile, the Alps and Himalayas formed, and twenty thousand feet down on the floor of the Pacific, lava welled up to build the Hawaiian Islands, which are the protruding crests of gigantic volcanoes. Rivers which had been sluggish now ran strong down newly tilted beds from risen highlands. In Arizona the Colorado was just beginning its task of excavating

the Grand Canyon, and Yellowstone Park was covered with smoking lava. Florida lay beneath Atlantic waters, and the mouth of the Mississippi was near Memphis. In the center of the continent, the Great Lakes were broad grass-covered valleys.

This was a time of change, of revolution. As the mountains rose for the last time, regions to the east of them grew drier, because they were shut off from the moisture borne by Pacific winds. Grasses replaced the lush vegetation of prior years, and the animals unable to adjust to new times and new methods perished. Strange creatures from South America migrated across the newly formed Isthmus of Panama to overrun the southern states. The Bering land bridge to Siberia foundered, and the Coast Ranges were shattered as they folded, leaving great cracks along which huge blocks of the earth's crust shifted and still shift. Some of these cracks, which geologists call faults, are hundreds of miles in length, and quaking California cities testify periodically to their continued activity.

So came a million years ago. Time was running short now. The ancient seas were gone, and the old mountains blunted. Already the new ranges were a bit tattered around the edges, and the giant volcanoes of the Cascade chain were merging into maturity. Running water was spreading the gold of the Mother Lode down the channel of the Sacramento toward Sutter's Fort. The Mississippi ran strong and fresh through its newly deepened valley.

The horse and camel and elephant wandered across the prairies or thundered deep in the forests.

Ice sheets were yet to come, changing the rivers, gouging the Great Lakes, and smoothing the rolling plains. After them, men were to march swiftly. The Indian, the Spaniard, and finally the white men from north Europe were to sweep with lightning feet across the continent to assist in making the last great alterations.

The Spaniards and the Indians were to make no real impress on the continent, except where it tapers off for a delicate union with its southern sister. The Spaniards were too few in number. The Indians populated the bulk of the continent only sparsely. They lived with the land, rather than on it, asking only a comfortable existence. It remained for Europeans to flow across the earth, like the hordes of grasshoppers during a Dakota summer's day, changing its face. And, plague or blessing, here they lie:

In the northeast is a great industrial triangle, whose base runs westward from Philadelphia to Chicago; its northwestward side follows the St. Lawrence; its eastern flank is the coast of New England. Within it lie the greatest cities, the densest population, and the maximum concentration of wealth. From it come three-fourths of our manufactured articles, and into it flow raw stuffs from the farthest corners of the earth.

Though it is homogeneous, in the sense that it is

primarily a region of machines, the industrial similarities are rooted in a variety of contrasting factors. The rolling landscape of New England, scraped bare by repeated glaciations, was early found unable to compete agriculturally with the prairie states. But water-power was abundant. The clever Yankee, schooled in the arts of sailing ships by years of deep-sea fishing, found world markets for the products of his skilful fingers. Colonial grist-mills alongside trickling waterfalls have been replaced by humming factories whose products are exchanged for the raw materials of far countries.

Westward, beyond the Adirondacks, whalebacks sail down the Great Lakes in endless convoy. Their cavernous holds bring the ore of Mesabi to surfeit the gargantuan appetites of blast furnaces which blazon evening skies from Chicago to the hills of Pennsylvania. Energized by coal long buried in the sands and shales of the Alleghenies, the furnaces in their turn nourish rumbling factories in smoke-blackened cities.

The land of corn begins where the western margin of the Alleghenies smooths into the central glaciated plain. Bounded on the north by shortened growing days, and on the south by the muddy Ohio, it dies out to the west as moisture lessens. Because it is peculiarly the home of corn, its multifold activities are shared by fat hogs, plump cattle, and the busy meat-packer. Chicago, owing allegiance also to the industrial northeast, is its capital. Its cornfields stretch in geometric rows for hundreds of miles,

bounded by the white ribbons of concrete highways. The rich level land shows the ravages of neglect and soil erosion only locally. This is the heart of America, far removed from the oceans, enjoying a culture and unity all its own.

South of the Appalachians and extending westward across the lowlands of the Mississippi into the black, waxy soils of Texas, is the home of cotton. Ravaged by slave labor and bankrupt by the Civil War, inhibited by a troublesome racial problem and scourged by soil erosion, it only now faces the future with new hope and higher courage. Land of great physical resources and wide forests, its soils are rich but lack the vitality of the glaciated plains to withstand long-continued cropping. Widespread neglect of fertilization, and the cash crop (cotton and tobacco) economy of the South have long been a hindrance to its early recovery from old troubles. Cheap fertilizer developed from newly exploited water power, careful exploitation of resources, and diversification of agricultural efforts should endow its future with far more prospects than it had in its past.

To the westward, close-drilled rows of wheat sway where the long grass of the prairie once rippled. The wheat fields stretch like a vast smooth sea. Horizons are broken only by water-towers and the ubiquitous windmill. This is a land of great distances and small towns. Every man is a gambler: if the rains fail he must wait an entire year to recoup his losses, and oftener than not rains fail for more than one year in

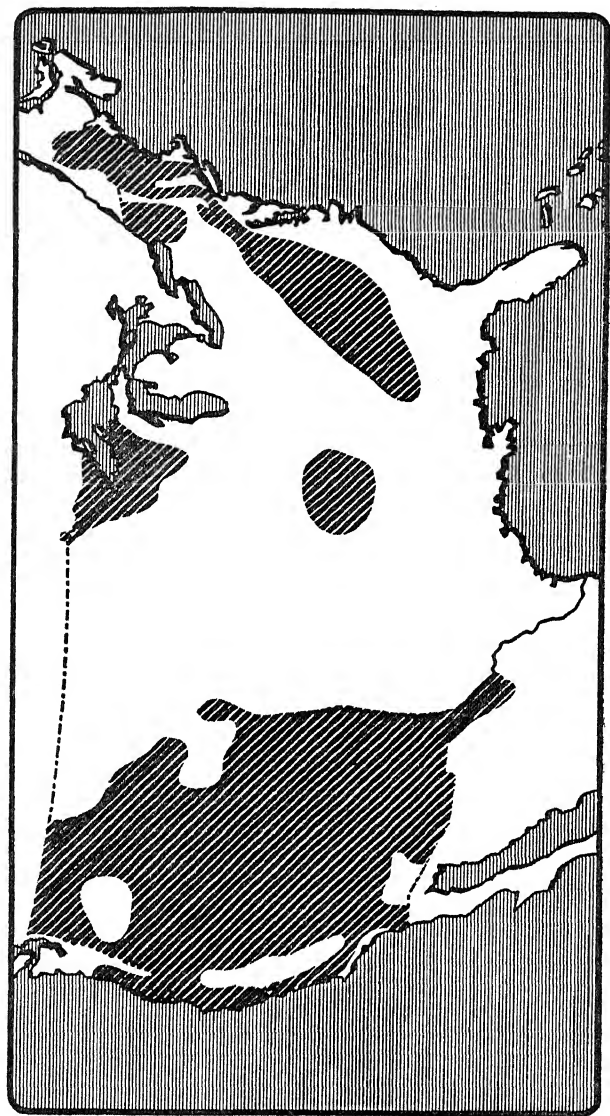
succession. People are scarce, and the farther west one goes, the scarcer water and people become. At about the hundredth meridian, where the gamble of wheat becomes a long chance indeed, cattle begin to dot the plains and the little rolling hills. These are no longer the lank longhorn steers of the early days of ranching but for the most part solid whitefaced Herefords, barons of the beef cattle. Thousands of them ride eastward each year to gorge on the crops of the Corn Belt before taking a last ride to the packing plant.

Except for green irrigated islands devoted for the most part to sugar beets and alfalfa, the land grows drier and browner and the vegetation sparser, until the plains bend abruptly into the slopes of the mountains. This is the land that the weather makes or breaks; in recent years it has mostly been broken.

The mountain country may never support many people. The beaver which first drew men into it are gone. The wealth of the mines is not renewable. This wide region of craggy peaks and sheltered valleys still has fewer people than any other comparable area in the United States. The whole area of more than a half-million square miles supports only the same number of persons as the city of Chicago. North Carolina, with one-tenth as much land, has the same population, and little Massachusetts, only one-seventieth as large, contains one-third more. Its largest cities are Denver and Salt Lake City. The former is about the size of Indianapolis,

and the latter slightly smaller than New Haven or Des Moines. Men group in mining-camps and in the small trading centers of irrigated valleys. Between them lie hundreds of miles of precipitous peak and deep cañon or broad expanses of desert. This is the land of Bingham and Butte, of dude ranches and ghost mining-towns, of the vanished glories of Tombstone and Virginia City. Within it lie the steaming Yellowstone, the towering Tetons, and bald-headed Pike's Peak. It has a fresh and stimulating savor, once tasted, always remembered.

A great capital H describes the mountains of California, Oregon, and Washington. The eastern standard is the Sierras and Cascades, the western is the Coast Range, and the cross bar is the Klamath Mountains. Within the southern half of this gigantic letter is the fantastic land of fruit. The gold of the Sacramento first brought men there in large numbers, but even then the farmers of the Willamette Valley, which lies north of the cross-bar, helped to feed them. The towering ranges to the east fend off the cold blasts of the continental interior. Warm sunlight and irrigation from the Sierras and the Colorado River create an outdoor hothouse where orange groves file down the foothill slopes like marching legions. In the northern states, the equable humid climate, in part controlled by warm ocean currents, produces an agricultural paradise. Out from the Valley toward the crowded cities of the east steam the express freights, rushing the fruits and fresh vegetables so

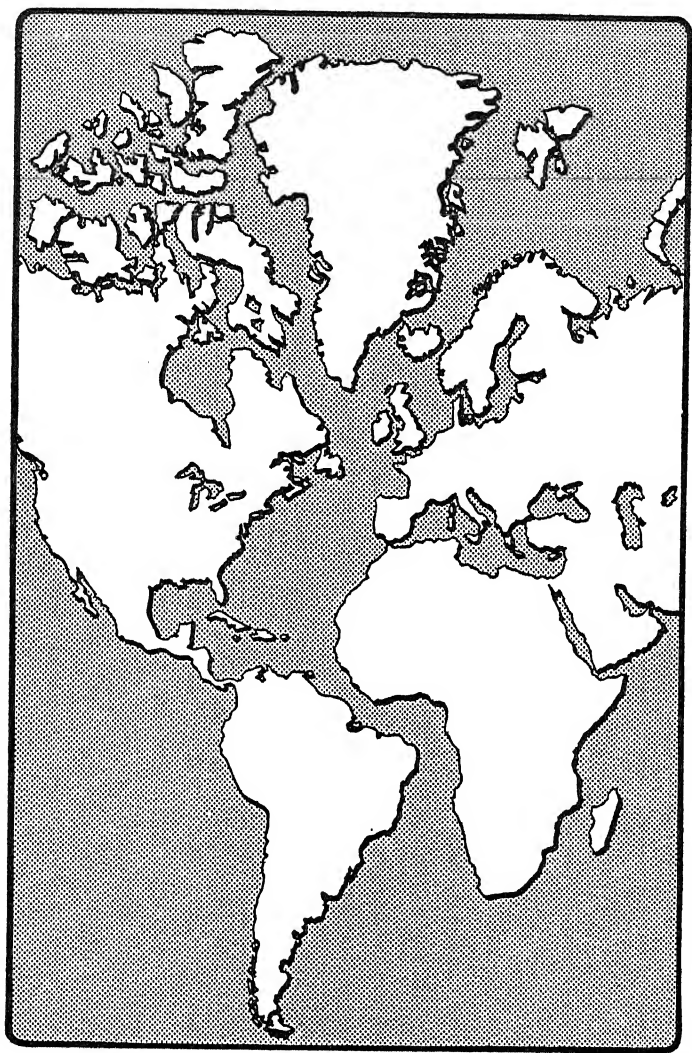


The shaded areas are mountains, hard rocks, or deserts which will never be able to support large populations. The white areas are plains, and the western third of these is too dry to be other than thinly populated.

Slave Coasts were located. The western thrust of North Africa then was enclosed by the westward indentation of the Caribbean Sea and the Gulf of Mexico; Spain lay against the Carolinas; Scandinavia was once joined to Baffin Land by the land mass of Greenland, which was left behind by the receding western continent. Like a mud pie pushed along a rough board, the advancing farther edge of the migrating land mass crumpled against resistance, and thus the great mountain ranges of the west were folded up, from Alaska to Tierra del Fuego.

Scientific fact or fancy, the Wegener theory is a useful imaginative device with which to recall in the mind's eye the geographic relationships of the Old and New Worlds. As a myth it is exciting to believe that the gods deliberately pushed two portions of the world apart that they might, in their bored omniscience, one day be amused by the dramatic efforts of earthlings to force their way across the "S"-shaped moat of the Atlantic.

Crouched in tiny sailing ships no larger than modern off-shore fishing boats, they first sailed desperately into the little-known perils of wind and wave and vagrant weather. They had no barometer to prophesy the approach of storms, no instruments to warn of blinding fog. Nor were their crude sails efficient in defying the vast winds which sweep tirelessly across the Atlantic. Their relative helplessness against wind and tide had much to do with the routes men followed across the seas, and these affected in



Did these pieces once fit together?

their turn the history of the New World toward which they sailed.

In contrast to those early adventurers, we know much to-day about these traveled sea-lanes. In the light of our knowledge, gained from four hundred years of observation, it is not difficult to comprehend why Spaniards first landed where they did, and why, at a time when the Caribbean and Central America had been charted, more northern America remained virtually unknown.

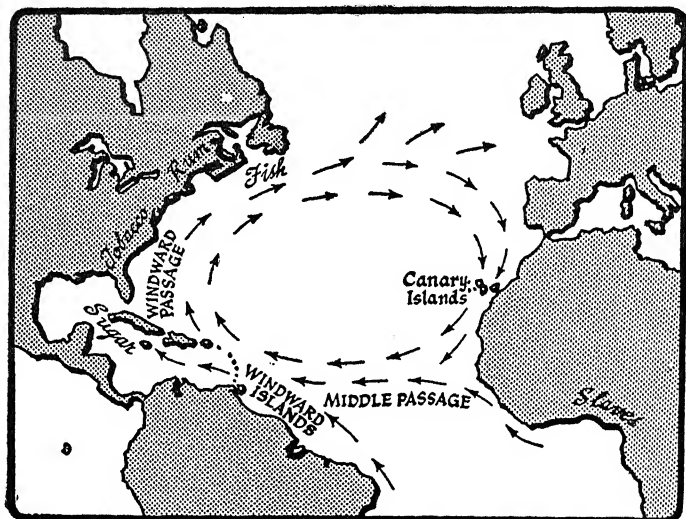
The Atlantic is an ocean of strange contrasts. More than three thousand miles extend from New York to the British Isles, but a few hundred miles farther north even a sailing vessel need never be far from land for more than a few days at a time. Northeastward from Natal, at the apex of the Brazilian bulge, Africa lies less than two thousand miles across the water. Unfortunately, this narrowest portion of the great ocean lies athwart the equator, where sun-warmed air, rising rather than blowing, left sailing ships becalmed for days on end in the pitiless tropic sun. Only a short distance to the north, however, the trade winds blow steadily westward from Europe. Portuguese sailors, who felt their faltering way down the western coast of Africa during the fifteenth century, early sensed the importance of the "trades." Hence, the Canary Islands became an intermediate point where the intrepid Mediterranean navigators stopped before launching their ships into the steady stream of these winds from the east, a stream which

wafted them westward without hesitation. It is not strange that Columbus and his Spanish contemporaries, sailing their little wood-hulled sloops, took this route in their search for the spicy islands of Asia.

In the North Atlantic, between the countries of northern Europe and the future Anglo-American nations, the winds blow eastward. They are cold winds, and stormy, and the distances are long. To sail against them, the navigator of the fifteenth century was forced to tack endlessly backward and forward, for his crude vessel could not, like the later clipper ships, sail easily into the teeth of the wind. Nor were the biting cold, the stormy gales, and the contrary winds all the hazards which he ventured. Thick sea fogs, impenetrable often for days on end, are common in waters between the British Isles and New England, where the icy Labrador Current meets the warm Gulf Stream. Floating noiselessly through the fog are icebergs, fragments of glaciers which squeeze seaward between the bleak coastal mountains of Greenland, break off, and float far southward in the current of the cold Labrador waters. Collision with them has plunged many a ship to the ocean floor. Even modern navigators have great cause to fear them, and since the great *Titanic* disaster an international patrol manned by United States coast-guardsmen has charted the paths and positions of the bergs to warn ships of their menace.

East of the Antilles, outward arc of the West

Indies, the warm ocean sails in a great swirl, thought long ago by superstitious sailors to trap unwary ships forever. Stirred by the prevailing winds and urged by the earth's rotation, the water circles endlessly in the Sargasso Sea. Out of it flows the Gulf Stream, bathing the shores of the Gulf and the West Indies,



Circuit of wind, water, and commerce in the North Atlantic.

thence flowing northeastward along the coast of the United States before turning toward the cold shores of northern Europe. There it splits into two currents, one bathing the coast of Scandinavia, the other drifting southward against the exposed flank of Africa. This in its turn joins the Equatorial Current, which

flows westward with the trade winds before striking the tropical coast of northeastern South America.

This gigantic ellipse of oceanic and atmospheric circulation is a vast one-way race-track, about which glided the sailing ships of the seventeenth century. Its quarter posts were planted at the Canary Islands, the Antilles, Newfoundland, and the British Isles. Despite the fact that it was much the longer, the only easy way to the New World was westward along the southern quarter. Spain, which lay close to the Canary corner, took full advantage of her position to gain control of the lands most easily reached by her gentleman adventurers. Even after colonization of the eastern shore of North America was well under way, British ships still followed the southern passage. As the slave trade prospered, shiploads of Negroes from the African coast were exchanged for sugar from the West Indies. Thence the ships sailed northward along the coast to touch at the continental colonies for cargoes of tobacco before completing the northern half of the circuit on their homeward voyage.

The coastal terrain south of the Hudson River was more encouraging to settlement than the rocky coast of New England. There to the south the land sloped gently away from numerous calm, branching estuaries, so that level crop land lay close to the wharves of ocean-sailing ships. The earth seemed rich, and the first plantings grew luxuriously in the warm porous soils. What the plantation owners of that day did

not know was that their soil, leached from the soft sediments of the Coastal Plains by millions of years of abundant rains, had little endurance. After a few years of cropping, its vitality became exhausted, yields were noticeably smaller, and the necessity for clearing new fields became urgent.

Settlement north of Cape Cod, where the warm waters of the Gulf Stream did not penetrate and the forest came down to the high-tide mark, was at first largely accidental. The *Mayflower* had started for Virginia, but such were the vagaries of weather and seventeenth-century navigation that she approached the coast at the northern base of Cape Cod. This northern region is inhospitable, with the granite roots of the continent exposed along almost every foot of coast-line. It was a fortunate chance indeed for those founders of New England that they landed unknowingly on one of the few fairly level, soft-rock areas of the entire region. The glacial boulder upon which they first stepped, preserved to-day from memento-seeking tourists by a concrete wall, epitomized well the nature of the land on which they chose to live.

Long before the Massachusetts Bay colony clung perilously to the fringes of the New England forest, daring Breton fishermen had braved the fogs of the Grand Banks to secure their fish for the sparsely stocked markets of Europe. Those cold and shallow, but stormy waters were fairly alive with the cod, that "bread of the sea." Hence, it was not surprising that before long French explorers first sailed from their

fishing villages up the mighty St. Lawrence to penetrate the heart of the Middle West. All this before the English had climbed the stubby mountains which barred their coastal villages from the interior of the continent.

Even to-day, the geographic relationships of Europe and the New World are difficult to realize. Study a globe, upon which the continents are truly delineated, and the misconceptions gained from map study alone are soon clarified. Most noteworthy, perhaps, is the western position of North America in relation to its southern sister continent, all of which lies east of Cleveland, Ohio. Central America, rather than extending directly southward, actually lies almost exactly along a line drawn southeastward from San Francisco, and the Isthmus of Panama extends almost straight east and west for a considerable distance. Almost parallel with it are the West Indies, with the Lesser Antilles curving southward in a great enclosing arc from the Virgin Islands to Trinidad. Hence, the Caribbean is almost entirely enclosed, as is the Gulf of Mexico just to the northwest, where Cuba and the Bahamas approach the extended finger of Florida.

If one were to draw a straight line from Jacksonville, Florida, to St. Johns, Newfoundland, it would approximately parallel the eastern coast of the continent. Furthermore, it would follow almost exactly a northeastern direction. For Jacksonville has the longitude of the point farthest west in South America,

and St. Johns lies almost directly north of the mouth of the Amazon.

Those of us living in the United States tend to confuse latitude and culture. We think Spain is southern, because Spanish-speaking countries in the New World lie to the south of us. By a similar token, we normally, and erroneously, think of the British Isles as being straight across the Atlantic from Boston and New York. Likewise, since Minnesota is filled with Swedes, Scandinavia is doubtless a similar distance from the equator.

But if we consult the globe once again, we find that maps and custom have played us false. For the line of latitude which bisects Spain and cuts off the boot-heel of Italy, also divides New Jersey and Illinois, and leaves our continent a hundred miles north of San Francisco. Moreover, New Orleans falls on the same line as Cairo, Egypt, and the vast deserts of southern Tibet.

As for Boston, it lies as far south of the British Isles as does Rome, or Milwaukee, Wisconsin. Lonely Moose Factory, in the frozen wastes at the southern tip of Hudson Bay, is the same distance south of the North Pole as London, while Berlin is closer. Most of the ice-scoured homeland of Swedes and Norwegians extends north of the southern extremity of Greenland, which we usually regard as fit only for Eskimo habitation.

It is a geographic generalization in the northern hemisphere that the leeward or eastern sides of con-

tinents are cooler than the western. Northeastern North America has a raw climate, while northwestern Europe is relatively mild. All free-moving objects in the northern hemisphere, such as air and water, if in motion long enough, bend to the right. For this reason, the prevailing winds are westerly, and the warm Gulf Stream bends obliquely northeastward to ameliorate the climate of northwestern Europe. Men live there in crowded millions. Within North America at the same latitudes the land is a trackless forest dormant for many months each year because of cruel cold and savage snow.

Thus it was that the winds and waves of the ocean currents, and the fogs and bergs of the Arctic waters, willed that Spaniards, who had never been noted seamen, should first found new overseas provinces for white men—to the glory of God and the power of his Catholic Majesty. In the New Spain that included the islands of the Gulf of Mexico and the continental coast that half confines it, the aborgines were reduced to subjection in less than a good Christian's lifetime. From a few dozen citadels, mere hundreds of Don Quixotes, with an entire hemisphere for their lofty schemes, made one whole continent and a third of the other indelibly Latin, Catholic, and quixotic. Moreover, the Spanish influence was to be felt in unexpected ways in the portion of North America destined to be Nordic and Protestant.

What the Americas offered to the Europeans was theirs for the taking. But after the first years of con-

quest and confiscation, the taking required labor—labor of a kind and to an amount which the one or two thousand Spanish immigrants a year were not willing or qualified to give of themselves. Therefore, by means varying from slavery to unlawful peonage, the natives were bound to the land to give it value. This was done successfully with the more civilized and sedentary Indians of the tropics and sub-tropics, but it was impracticable among the wilder and unsettled tribes of the temperate plains and forests. The former were fixed where they were found, and remain there to-day, but the latter were slowly pushed out. That is to say, while the good Indian to a Spaniard was a hard worker, to the British settler of Pennsylvania or New England the best Indian was a dead one. If it be remarked that Spanish enslavement was worse than English expulsion, let it be observed that as late as the opening of the eighteenth century there were fourteen hundred Indian slaves in South Carolina.

The white man was always reckless in his first exploitation of the natural resources which he found in the Western Hemisphere, and this was true of his initial waste of the labor supply on the islands of the Caribbean and the Gulf of Mexico. Abused and overworked in mines, plantations, and cattle farms, the Caribs were soon killed off by their masters. From experience and conscience, more humane treatment was applied on the mainland, but this could not re-

store the precious labor needed to grow sugar on the West Indies.

The necessary replacement of the extinguished natives resulted in the first of those dramatic population movements which characterize the resettlement of the Western Hemisphere. The new labor was brought by way of that "middle passage" between Africa and the West Indies where the sailor knew he could depend on the steady, westward-blowing trade winds. The effect was a permanent African ingredient in the population of the New World. In the West Indies to-day, it is overwhelmingly predominant, and on the continent it is decidedly important from the Ohio River all the way to the Amazon. Where the African strain is not represented by Negroes themselves, it is often evident in the altered complexion of the Indians or in the darkened color of the whites, with whom it has mixed. If Negroes are properly defined as the "Jim Crow" laws in Alabama or Texas classify them, then there are nearly as many in the New World to-day as in the African countries bordering the Atlantic Ocean from the Congo River south to the Cape of Good Hope.

Shipping human beings has been a great and profitable business several times in American history, whether it was indentured Englishmen sailed to Virginia, Swedes railroaded into the Dakotas, or Slavs beguiled by steamship promoters to Chicago slums. But none had greater returns on a well-managed investment than the African slave trade, which fol-

lowed the clock-wise circulation of the Atlantic wind and ocean currents. At its height in the eighteenth century, slave trading was worth many provinces; in fact, England in a peace treaty with Spain took as part of her share of spoils from a general European war the business of carrying slaves to the Spanish Indies. During the third of a century after George Washington was born, British shippers brought over twenty thousand annually, until even the continental colony of South Carolina was twice as black as it was white.

It was the labor of these Africans on the plantations of the Indies that changed cane sugar from a gentleman's luxury, hitherto imported from the Mediterranean, to an everyday staple. The control of the growth and distribution of this new commodity quickly created powerful vested interests which formed the opinions of lawmakers and shaped the schemes of diplomats. One of the tiny Antilles was even matched in a treaty bargain equally with all of Canada. Legislative favoritism to the sugar planters' lobby in London was to help make resentful rebels in Boston and Philadelphia.

On the North American mainland, however, it was first the culture of tobacco rather than of sugar that made work for Negroes to do. Introduced to Europe as an American curiosity, advertised as a medicine which even school-boys must take, its use became a pleasant habit associated with all manner of fashionable accoutrements. The discovery that its produc-

tion would make the faltering Virginia settlements pay their own way established it as a staple for these and subsequent southern colonies. Grown on large plantations with Negro labor, it misled the producers into a one-crop agriculture, a precarious economic dependence on the mother country, and rapid exhaustion of the coastal soils. So essential did the aromatic leaves become that they served as a medium of exchange. In the early seventeenth century, freight charges for imported brides were paid with it. At the very eve of the Revolution, His Majesty's law notwithstanding, Patrick Henry's way with a jury cheated Anglican parsons from their compensation in tobacco legal tender.

From the South Atlantic States the Negro, and slavery with him, was carried west to the fertile lands and hot and humid climate adjacent to the Gulf of Mexico. During the first decades of American independence it was the southerner who showed the most intense interest in our western expansion. The wasteful, soil-exhausting cotton planters must ever have new lands—and cheap, for their capital was absorbed by the purchase and maintenance of machinery, which being human was expensive to keep in running order. Four times in the first half of the nineteenth century, to their immediate advantage, pieces were carved from neighboring Spanish America: Louisiana purchased from a temporary French possessor; West Florida transferred by revolution; East Florida bought with money and a threat, and Texas

annexed by rebellion. It was the expansion of slavery more than its morality that brought on the irrepressible congressional conflicts, the provocative court decisions, the bloodletting in Kansas, and the sectional election of 1860, which preceded the Civil War.

The belated self-righteousness with which New England insisted after 1830 on the abolition of slavery can not conceal its guilt in abetting the creation of that complex of institutions of which slavery was a part. Yankee shippers, sharing the advantages of the British mercantile empire, participated extensively in the slave trade. Yankee distillers produced rum from slave-grown molasses carried from the Antilles—rum taken to Africa to exchange for captured or kidnapped natives shipped to the Antilles to produce molasses, to make rum to take to Africa.

To a considerable extent the entire economy of the colonies north of Chesapeake Bay was bound to the sugar islands. Fish and food and lumber products found an outlet there that they lacked in the mother country. New England merchants grieved only that royal regulations tried to confine their trade with those of the West Indies which were English and to keep them from those which were French and Spanish. When the Revolution finally freed them from that imperial restriction, they still wanted to enjoy the benefits of imperial inclusion, wherefore much early American diplomacy was directed toward opening the British islands to American ships.

Slavery itself, however, did not thrive north of Chesapeake Bay. This became a white man's country, of fishers, whalers, craftsmen, merchants, and, especially, small farmers. The northern farmer lacked the large capital investments required by Negro ownership. Instead of growing great quantities of some staple like tobacco, cotton, or rice, to sell abroad, he raised what foodstuffs he could by himself, with the help of sons or a hired hand, and consumed most of it within his fence lines. Because it was not transformed into cash, slave labor on unmarketed farm products did not pay for itself. It was a luxury, a piece of "conspicuous consumption," like an extra team of horses used only for pleasure driving.

What became the typical American farm did not develop on the thin-soiled, rock-strewn hills of New England, where the farmers lived in clusters of houses called towns. The mode of rural life for most Americans (until the end of the nineteenth century) was fashioned in the more fertile fields of the Middle Atlantic States. Here the families of soil tillers lived separately on single farmsteads, as they still do in Ohio, Illinois, Nebraska, or Oregon. When they moved to new lands they moved as families, not—as did the Yankees—in colonies. Furthermore, it was here in the middle colonies that the Swedes or Finns introduced the log cabin, which became the typical dwelling of the frontier. The farming life of this New York—Pennsylvania—New Jersey region was blended from the agricultures of several European

stocks, for here the nationalities were particularly various. Good breeds of livestock and proficiency in dairying came with the Dutch. Scotch coming from Ireland established the culture of the potato, which though of American origin was first extensively planted by whites in Europe. Germans created the characteristic American barn, a stove to take the place of the English fireplace, and the Conestoga wagon.

The barrier of the Appalachian Mountains, and the rough terrain of the Allegheny Plateau behind them, discouraged these farmers from a direct east-to-west migration. The one easy, sea-level gap through this obstacle, the Mohawk River trail from the Hudson to Lake Erie, was closed by the Iroquois Indians, most highly organized and most effective fighters of all the tribes between Boston and Santa Fé. Diplomacy demanded that they be courted as allies against the French in Canada, and profit insisted that they be used as middlemen to make contact with the fur-trading Indians of the interior. It was the line of least resistance for seekers of new farms to travel in the direction of the valleys lying between the ranges of the Appalachian Mountains. This direction was southwestward from central Pennsylvania along the back of Virginia and the Carolinas. Families could migrate for two generations down these intramontane valleys without altering their mode of living or finding themselves in an unfamiliar

environment. Everywhere the soil, which rested on limestone strata, was fertile and enduring; changes in climate with accompanying alterations in plants and animals did not occur, despite the more southerly latitude, because of a steady rise in altitude. By the time of the American Revolution, the Boones and the Lincolns and other frontiersmen were already settled at the famous gap which opens up the lower end of the valleys to the west—the Cumberland Gap, located at a point near the head-waters of most of the larger southern tributaries of the Ohio.

The stage was now set for the greatest migration in human history. It had taken three hundred years for Europeans to settle around the edges of the great central plain of North America; now, in one-third of that time, they were to occupy it. True it was that scattered very sparsely throughout were small numbers of Frenchmen. But they had proved to be only pathfinders unequal to the task of making the land their own. Their chief economic interest, the gathering of furs, had by its very nature enticed them to learn with astounding rapidity and to reveal the geography of the Mississippi and Great Lakes basins. But a rigid economic and political system, with the religious and social paternalism of the Bourbons, kept out the thousands from France or central Europe who might have found here a place of refuge or profit. The lilies of France, only superficially planted, were rather easily uprooted by British red-

coats. The courtiers and royal mistresses at Versailles were more interested in cities on the Rhine or duchies in Italy.

When the French lost control of the Saint Lawrence Valley to England, they gave up any attempt to maintain the rest of their continental empire. They relinquished to Spain their control of the mouth of the Mississippi, the other easy approach to the interior of America. Spain was bound to dominate New Orleans in any event, for it could be approached from the sea only by the straits passing Cuba. It had not been by salt water but down the river itself that the French had first reached the delta. Their settlements there had always been dependent upon those upstream in Illinois or Quebec.

The quarter of a century between the Battle of Lexington and the death of George Washington created ideal conditions for settlement in the north-central plains. The Revolution eliminated the irksome features of absentee British ownership. The new congressional proprietors provided for the unoccupied land a political system devoid of imperialistic exploitation. A half-dozen years of bloody campaigning destroyed the last serious Indian resistance. The land itself, rapidly mapped by surveyors, was quickly sold with clear titles to alien and citizen alike at very low cost. Before long it became an American dogma that he who wanted a farm ought to have it.

Meanwhile Europe was beginning to feel acutely the effects of several centuries of steady population

increase, an increase actually accelerating during the first decades of the nineteenth century. To this increase the New World had contributed by supplying new foods like the potato and corn, and by raising other subsistence supplies like sugar and cotton. The rising reservoir of European humanity had really only trickled out to America before; after the Napoleonic Wars it began to gush out whenever it was agitated by economic distress or political discontent.

CHAPTER THREE

"I'll Take My Stand"

THE best spot from which to observe the expansion of the United States during the first quarter of its history is at the three corners where Virginia, Tennessee, and Kentucky join. Through this point runs a fault in the mountains, where the folded rocks split and slipped and ground against each other. Crushed and weakened by the faulting, the rocks were easily broken up by heat and cold, by rain and frost, and then washed down. The result was the Cumberland Gap, an opening in the mountain which offered easy access to the interior of the United States.

Immediately west of the gap two fertile limestone islands emerged from beneath the sandstone-capped hills. These were the Blue Grass and Nashville Basins of Kentucky and Tennessee. In both, the layered rocks of an ancient sea-floor were bent upward gently, in dome-like fashion. Later the streams, which always attack high points first in their task of reducing the earth to a level plain, completely wore away the hard sandstone crests of the domes. Once revealed at the surface, the lime-

stone quickly eroded downward to form depressions of gently rolling fertile fields similar to the floor of the great limestone valley down which the pioneers had traveled to the Cumberland Gap.

Across this stream-worn threshold came the people who more than any others were pioneers on all the Mississippi Valley frontiers. They were a breed of woodlanders with at least a generation of wilderness traditions, reared in the kind of forest lore which helped them to read trails beneath trees, find ample food, discover good soils, and locate likely cabin sites. Until the grasslands far to the west were reached, they could be at home anywhere. Set apart by speech and habit, this kind of man was called by various names in different places: Indiana "Hoosier," Illinois "Sucker," Missouri "Puke" and "Pike." If in these terms there was a contemptuous comment on their crude manners, there was also an emphasis on their special skill of living without the assistance or comfort of more stable and sophisticated society. How widely and rapidly these people were dispersed is illustrated by the Boone, Crockett, and Lincoln families, all of whom passed into the West through the Cumberland Gap during the last twenty-five years of the eighteenth century.

The Boones may be taken to represent the people who opened up the frontier immediately adjacent to the Gap, and who brought Kentucky and Tennessee into the Union as the first states beyond the Appalachians. Daniel Boone built a cabin by a

salt lick on the south bank of the Kentucky River in 1775. Hundreds immediately followed him along the Wilderness Trail, which he had marked from the Gap to the limestone basin in Kentucky. Some of them named their settlement Lexington after exciting events occurring far northeast beyond the mountains. Within a score of years not only Kentucky but Tennessee as well were organized as states. Boone, however, pushed on west into Missouri, and settled there while it still belonged to Spain. He lived long enough to observe the preparations for accepting it also into the Union as the first state beyond the Mississippi.

Kentucky, Tennessee, and Missouri are to-day called the "Border States." It was along their latitude that penetration was most directly and rapidly west. The pioneer vanguard here thrust out a salient which for a time left the country on both northern and southern flanks unsettled. From it came the men who led the way on two other frontiers, northward to the glaciated lowlands above the Ohio and Missouri Rivers, and southward to the coastal plain along the Gulf.

There was Davy Crockett, for example, born at a place in Tennessee very significantly called Limestone. The humorous legend of exaggeration which grew about him must not obscure the true features of his frontier skills and his qualifications as a backwoods leader. But Crockett died neither in Tennessee, nor in Washington, D. C., where he served as a

Tennessee congressman. He fell at the Alamo, battling on the farther frontier of the Southwest.

Davy Crockett southwest to the coastal plain, Daniel Boone west to the valley of the Missouri, but Abraham Lincoln northwest to Illinois. The grandfather of Kentucky's most famous native son had come out from the limestone mountain valleys through the Cumberland Gap during the seventeenth-eighties. The father, Thomas Lincoln, exemplified the border-state migration across the Ohio River—the migration which settled Ohio, Indiana, and Illinois from the bottom up, giving them an early southern quality. Before he was of age Abraham was a Kentuckian, a Hoosier, and a Sucker. Later the great story-teller told of a family he knew whose chickens of their own accord lay on their backs each spring to have their feet tied for the annual removal to a new home.

Behind these first frontiersmen followed people less able to open the wilderness, but better equipped to lay out plantations, establish cash-paying farms, and found cities. For the Hoosier, Sucker, and Puke were merely the scouts on one front of a great population migration which encompassed the entire world. What happened in the United States must be appreciated in the light of these greater planetary activities.

During the nineteenth century mankind was on the move as never before. In that action participated not only the millions of white men who crossed the

seas to other continents, but other millions as well who moved from earlier settlements on the coastal edges of those continents into their interiors. Nowhere, it is true, was the expansion of Europe's children so grand as on the extensive plains lying between the Appalachians and the Rockies. There the restless, fluid, and unpredictable flow was a marvel to behold. Boundaries were as helpless before it as a rail fence in a flood. The excited mind reviewing this mighty movement will not be satisfied with prosaic explanations. Economic, political, religious, and other everyday motives for human conduct added together still seem too weak to have impelled this massive migration. One remembers how crowds collect at a fire, gather about a fight, congregate at a football game, jam before a shop window, or throng upon the November band-wagon.

But the migrant, be he fugitive from tyranny or poverty, rebel for faith or fashion or fantasy, must somehow be loose from earth and hearth. Movement is a freedom. Invention of better means of transportation weakened the restraints of friction and gravity. Their effects would have been little if statesmen had not at the same time removed the old legal walls which confined nations from without and divided them within. Modern Americans, so free to move the length and breadth of a continent without the let of a lord and hardly the hindrance of a boundary, are likely to overlook this freedom. In forgetting it they are likely even now to let selfish local laws sneak

it away. An obstacle which the pioneers did not have to overcome was the kind of barrier which to-day would keep farm laborers, truckers, school-teachers, and physicians from crossing state boundary lines.

During most of the Christian era men have usually been bound to a locality, not by gravity or poverty or sentiment alone, but by law. For their own good or their masters' they were confined, sometimes mildly as are children by a curfew, but often harshly as were Negroes before the Civil War. The lawful freedom to move began to come for most white men with the decline of medieval serfdom, which had tied men to the land in order to assure a labor supply upon it. Movement as a common liberty came first to England, and then slowly, often painfully, to the rest of Europe; to much of it only during the nineteenth century.

Among the conditions that helped Britain settle the entire coastal plain from Maine to Florida was the fact that Englishmen could move if they would, and that foreigners were not only tolerated but coaxed. Meanwhile, Frenchmen made but a bare beginning along the estuary of the St. Lawrence. There were those in France who would have been glad to leave for conscience's sake, but a Bourbon Pharaoh would not let them go. No French heretic was given a Canaan like that of the English Penn in which the Protestants of central Europe could fulfil the wills of their own peculiar Jehovahs. When at last France and Britain fought the decisive battle

of empire on the Plains of Abraham (overlooking the St. Lawrence), the French had less than one hundred thousand colonials, though there were ten times that many Anglo-Americans. While hardly five thousand French had scattered along the easy highway of the Mississippi, forty times that many English subjects had struggled the hard way through the mountains to head-waters of the Mississippi tributaries.

A great English friend of America affirmed its power to increase even as it reached a rebellious majority. Said he to the House of Commons during that time when the colonies were loosening the imperial bonds: "Such is the strength with which population shoots up in that part of the world, that state the number as high as he will, whilst the dispute continues the exaggeration ends." But even Edmund Burke could hardly have prophesied that the American people would multiply fifty-fold in one hundred and fifty years after their break with the mother country. How could he know that forty million Europeans would travel to the United States, that in a single decade the number of immigrants would be half again as large as the total population of England in his life-time?

The expansion of the Americas derived force, moreover, from still another condition which was only slightly apparent in Burke's day. That was the rapid population growth. A thousand years ago there were only one and a half million English-speaking

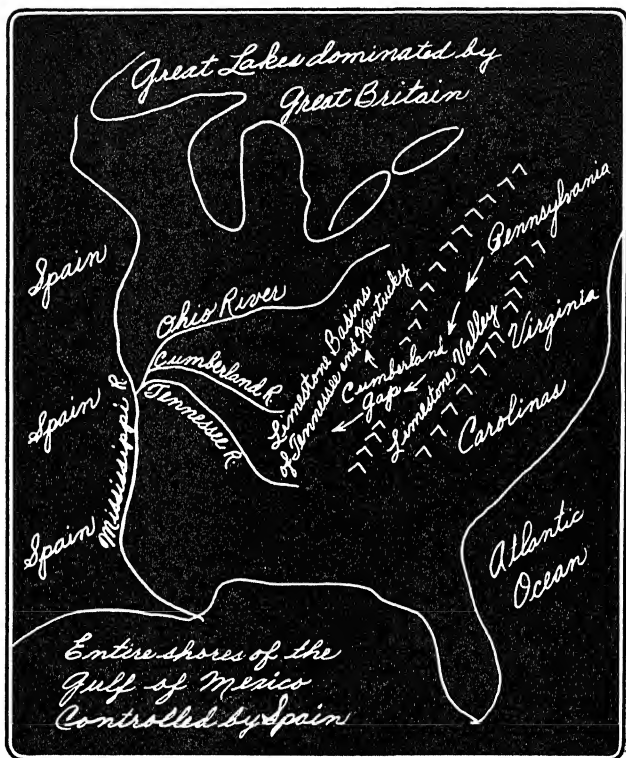
people. This was less than live to-day in the single state of Alabama, which is about the same size as England. Seven centuries later the population had increased to only four or five times that number. But since then, in only a century and a half, there has been another four- or five-fold multiplication, not counting the millions removed to the Dominions, nor the many more millions of British ancestry living in the States.

This remarkable enlargement of mankind, not by any means confined to the British Isles, was already beginning in the generation of the Pilgrim Fathers. It hastened by the time of the American Revolution, and continued during the nineteenth century.

How many important historical developments must be explained partly by the simple fact that human beings were more numerous! There were more, and always more, crowding old land, needing elbow room, trespassing upon new land. There were more to serve in armies and navies. There were more to use and to want things, and more to invent them. It was certain that there would be more ideas, for the millionth man is as much a new and different being under the sun as was the thousandth. And when the population in an acre or a city block grows from two to four, the potential direct exchange of ideas, or words, or things does not merely double but becomes six times greater. If larger numbers are involved in this multiplication, the magnitude of the increase transcends imagining.

The growing American nationality from the first expressed to a particularly optimistic degree a conviction of gigantic mission for the world. It envisaged its domain as a limitless repository of freedom, an open asylum for fugitives, an area inexhaustible in good living. It deserved, therefore, to be continental in scope. Planning on a grand geographic scale was already a confirmed American characteristic before independence, derived from colonial years when corporations of freemen were granted land in broad strips indefinitely extended into the continent. There had been a time when an English gentleman could settle a family debt for an area as large as England itself. There came to be a day when colonial land speculators grew restive under royal rule because it would not confirm their "subdivision" of a million acres, more or less, in the Ohio Valley.

But whatever the grand design of the founding patriots, the real truth was that American national history began with its geographical destiny in a box. The box was open only at the back or Atlantic side, and was closed at the other three. To the north lay British Canada, reluctant to surrender even its outposts on the south shore of the Great Lakes. Toward the setting sun the course of American empire was stopped short at the Mississippi, the western bank of which was Spanish all the way from New Orleans to its then unknown but mistakenly presumed source in what would now be Canada. To the south another Spanish boundary, even when pushed



This blackboard diagram describes the geographical situation of the United States immediately after the Revolutionary War.

down to the diplomatic utmost, kept American sovereignty from access to the Gulf of Mexico, in several places by no more than the width of a county. Half a dozen American rivers meandered for several hundred miles through the coastal plain but could not

empty into the Gulf unless they flowed their last few miles between Spanish banks.

Within fifteen years of the winning of American independence, enough settlers had come into the hub of this encircled area to warrant formation of the states of Kentucky and Tennessee and the organization of the rest of the area into territories. The road over which these people came had been too hard for them to cherish it as a bond to their former homes. The wall of the mountains lay to their backs. Before them it was downhill to the basin of the great river, or if they pleased to the trough of the Great Lakes. Most of them were of families like the Lincolns or the Boones which had been two or three generations in moving down the limestone valleys of the mountains, out from the Cumberland Gap, and then over to the limestone basins of Tennessee or Kentucky. Home was now west of the mountains, or nowhere!

Many who entered the rough plateau, where the passage was not so easy or obvious as at the Gap, were caught in the maze of narrow valleys and shut off from the larger life of the nation. Here they were discovered a hundred years later by philanthropists, romanticists, and industrialists, as "hill-billies," "mountaineers," or cheap labor.

To retrace the Wilderness Road through the Gap with produce was possible but impracticable. From Lexington to Philadelphia, then the American metropolis, was a round-about fifteen hundred miles.

Some settlers had come more directly by floating down the Ohio, a route which came to be used more and more, but, here again, to go back against the current was less easy. When the head of the Ohio had been reached there still remained the many mountain miles from Pittsburgh eastward. The "roads" ran through country so inaccessible that grain was distilled into its most transportable form, and the Whisky Boys rebelled against the revenueurs who interfered.

The western settler must go west or not at all. The good highways all ran to the Mississippi and the Gulf. If the states along the seaboard would come with them it was well; if not, it would be necessary to go on without them. Because Europe controlled the gates to the interior plain, European entanglements were unavoidable. For two decades the Kentucky and Tennessee settlements were excited by schemes for erecting a western principality, if need be with foreign assistance. In that West the leading hero of the Revolution, George Rogers Clark, was commissioned a general by France. The highest ranking officer of the United States army, then stationed in the West, was for years in the secret pay of Spain. A Tennessean was expelled from the United States Senate for plotting with Britain to separate the Mississippi Valley from the eastern seaboard. Aaron Burr, ex-vice-president of the United States, was saved only by a legal technicality from conviction for treasonable schemes of the same na-

ture. And twenty-five miles upstream from the mouth of the Missouri River, Daniel Boone served as a magistrate in the government of His Most Catholic Majesty, the King of Spain.

Rectification of these western boundaries was finally made possible not at all by conspiracy, and not so much by American diplomacy, as by the uncertainty of European nations during the quarter-century after the Fall of the Bastille. First, through that more or less honest boundary broker, Napoleon Bonaparte, Americans acquired the Spanish territory about the mouth of the Mississippi and west beyond it. He was rather vague about some of the details of the title, but suggested that the consignee make the best of a good bargain. Spain, then in Napoleon's receivership and overwhelmed by the job of holding on to the rest of her New World properties, was in no position to refuse delivery of Louisiana. In fact, fifteen years later America dared to follow up a trespass on Spanish Florida, not with the expected apology but with an ominous remark about proprietors who could not keep their fences in order. Taking the hint, Spain sold out the rest of her holdings on the north shore of the Gulf.

Another American effort to capitalize on the Napoleonic distraction of European powers failed completely. This was the attempted conquest of Canada. It was forced on the country by western War Hawks and their southern copartisans, despite the opposition of New England shipping interests who were piqued

at a war ostensibly fought to win them freedom of the seas but actually bound to bring the full effects of Britannic sea strength upon them. America invaded Canada at Detroit, at Niagara, and by way of the old colonial military route in the Lake Champlain trough. These invasions were astonishing failures. Before the war was over, Westerners had to turn south to the much more serious matter of saving the newly purchased mouth of the Mississippi from English veterans brought fresh from successful wars against Napoleon himself.

The war ended without any stated consequence of significance. In so far as the British boundary to the north was a menace or a barrier, it was removed during the next generation by more peaceful devices. The Great Lakes, on which Americans had hastily built a fresh-water fleet, were disarmed by mutual common sense. The Canadian customs gates on the St. Lawrence gradually became unimportant to wheat-growers as the mother country developed a policy of free trade. In so far as the boundary clove two nationalities, it did become stronger. The passions of war had confirmed the separate feeling of the Anglo-Canadians, who had always felt like American step-children, for most of them had been Loyalists of the American Revolution. They did not yearn toward thresholds over which they had first been cast out and later assaulted.

The war had also served to break forever the strength of the Indians east of the Mississippi, a

strength which depended more or less on the potential, when not the actual, support of white allies. The first decisive defeat inflicted upon the Indians in the Ohio Valley had taken place within a few miles of a British fort intruded upon American soil, at the mouth of the Maumee River, on the present site of Toledo. For the next twenty years the Indian frontier lay along a southwesterly line following the valleys of that river and of the Wabash. This was a continuous depression down which the Great Lakes had drained to the Mississippi during one stage of the Ice Age. Just before the second war with Britain, Tecumseh set out to organize the tribes behind that line into a defensive confederation in which the tribes near the Gulf were also to join. In a sense the War of 1812 really began in 1811 when the western settlers attacked this confederation at Tippecanoe near the middle of the Wabash-Maumee line. Tecumseh finally fell while fighting as a British ally in Canada. In the south also, on the edge of the fertile plain which borders the Gulf, a decisive defeat of the Indians preceded by ten months the more famous repulse of the English at New Orleans.

This Gulf coastal plain was delivered to the American whites of the south no sooner than it was needed. It was the very nature of that Old South to expand: it must have room to live or it would die, as it finally did while opposing the effort of the North to thwart its continuing extension. Tobacco culture had required large estates or plantations for

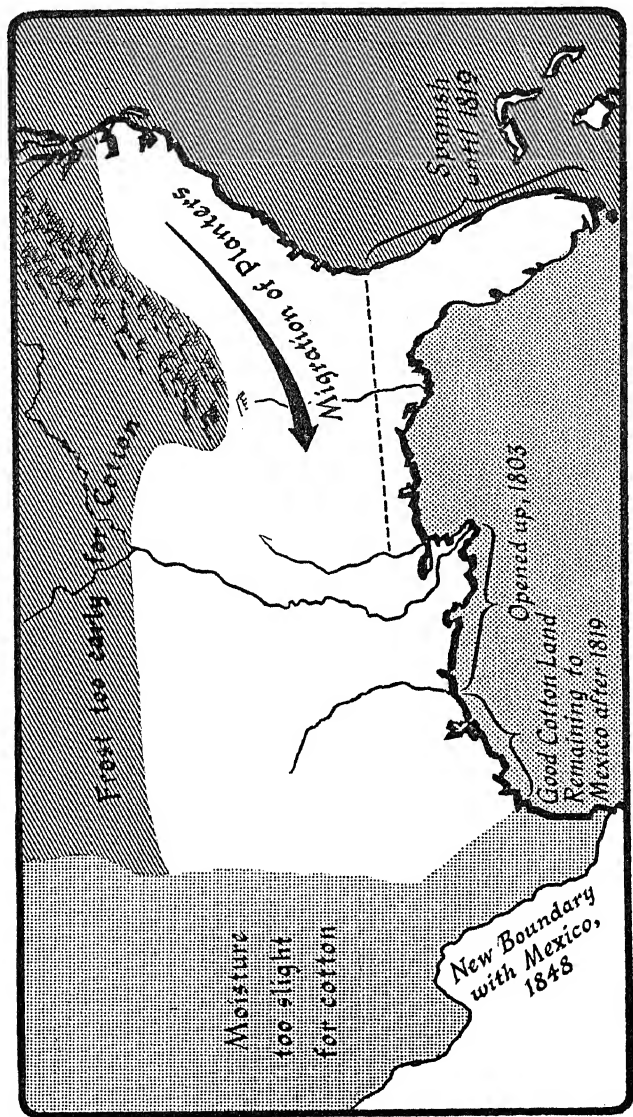
its cultivation, not because it was best cultivated in large land units, but because it exhausted the fertility of the soil rapidly. He who would live by tobacco growing had to have fresh lands ready to replace those wasted. During the last quarter of the eighteenth century there was added to this normal pressure for new soils still another. This was the increased demand for cotton land, created by technological developments in the English textile industry. The enhanced prices turned not only the tobacco plantations of the Atlantic tidewater to cotton, but also the up-country farms that had been growing food stuffs. Cotton could be grown about as well by a single farmer on a small farm as by slave labor on large plantations, but one man could make a better living with the help of one slave, and a fortune if he had the services of a dozen.

Cotton requires a long growing season, with hot weather and a rich soil, the very conditions offered by that continuation of the Atlantic coastal plain along the north shore of the Gulf. Here too was repeated the pattern of numerous ocean-approaching rivers. From the Potomac almost to the Rio Grande they afforded cheap transportation within easy reach of almost any cotton planter. From many miles upstream the cotton bales could begin the water-borne journey which carried them to the mills of Old and later of New England.

It was the nature of cotton culture to require an unlimited supply of new soil. Though the plant had

only a small root system and took relatively little fertility out of the soil, that soil must be loose, and needed constant, clean cultivation. Under the heavy rains which were essential to cotton growing, the fertility elements of the soil dissolved out, the surface was washed away, and the fields were cut up by gullies eroding wider and deeper every season. Old plantations soon could not meet the competition of newer ones, and the owners of the former sought fresh land. A frontier of small farmers moved around the base of the long Appalachians, cleared the rich lands of their thick forest cover, and then sold out to men with cash or credit who put a number of such small clearings together to make a new plantation.

So rapid was the population movement into the coastal region north of the Gulf, particularly after the War of 1812, that by 1845 all of it belonging to the United States was organized into states. So energetic was the mining of this fresh Gulf slope that its cotton production had then already exceeded that of the older Atlantic states. Most of the settlers came from the latter commonwealths or from Tennessee and Kentucky. This was true of Negroes as well as whites, for after 1807 the foreign slave trade was illegal and new field hands had to be imported from border states like Virginia or Kentucky. There, because of frosts, cotton culture was too hazardous. Besides labor, these northern slave states were also a source of foodstuffs for their more highly specialized coastal neighbors. Although tobacco re-



Expansion of the Cotton Kingdom.

mained a characteristic crop, these states on the southern bank of the Ohio River, along with their neighbors on the northern bank, soon developed into the wheat and corn growing province which remains to-day.

The westward conquest of the coastal plain by King Cotton did not stop with the boundary line between Mexico and the United States. In Texas there still were thousands of desirable acres. These continued on around the northwest curve of the Gulf, until near San Antonio the country suitable for cotton culture petered out.

Two conditions, one climatic, one geologic, accounted for this abrupt and sudden change. Moisture-laden air, carried northward from the warm waters of the Gulf, found it difficult to penetrate to the parts of Texas lying west of the Gulf. The prevailing westerly winds from off the shore blew the humid air masses of the Gulf relentlessly eastward. Only occasionally did they reach far to the west. Therefore cotton, requiring a regular humid climate, could not be grown profitably in that area. It was there, also, that the edge of the Edwards Plateau, capped by hard limestone and carved by deep cañons, rose precipitously out of the rolling lowlands of the Black Prairie. This is an eastward lobe of the plateau which to-day comprises most of modern Mexico.

If the boundary originally established between the United States and Mexico had run through the semi-arid country between the San Antonio River

and the Rio Grande, so as to include in the United States the remaining humid portion of the coast, the basic condition of the Mexican War would not have existed. Though that conflict expressed a "manifest destiny" to many American nationalists everywhere, the greatest enthusiasm for it was in the South. In the North, anti-slavery radicals opposed it, and many men of more moderate sentiments, such as Congressman Abraham Lincoln, openly regretted it.

The peace treaty, it was true, added to the United States much more than the Texan part of the cotton belt. In many quarters it was soberly suggested, after our victory, that the American eagle might as well fly home with all of Mexico in its talons. In the end such jingo gringos had to be satisfied with no more than one-half of Mexico.

The northern line of the cession, which was a thousand miles wide, lay in the latitude of Chicago, Cleveland, and Cape Cod. At the opposite extremity it extended as far south as the Florida Everglades. But, except for much of Texas and parts of California, practically all of it comprised dry, short grass plains, semi-arid plateau, desert, and mountains. It was by nature suited to the Latinized nation from which it was taken and unfamiliar to the people who had conquered it. Only by adjustment of law and livelihood would the North Europeans who were building America be able to live in a land more nearly within the experience of Spain and the other Mediterranean countries.

CHAPTER FOUR

“Let All That Breathe Partake”

IN 1805 the ship *Louisiana*, a sailing vessel of three hundred tons, was delayed at the harbor of Trieste in Italy because she could not establish her identity to the port authorities. They insisted that there was no such port in the world as Marietta, Ohio, from which the ship's master insisted she had come. Who had ever heard of a sea-going vessel which came from a port a thousand miles inland from salt water? In all truth, however, the *Louisiana* had come from Marietta. In fact, she had been built even farther up the Ohio River, at Pittsburgh. At that river port there was a large shipyard with all the things necessary to complete sea-going vessels, including an anchor smithshop, a pulley manufactory, and a sail and rigging loft. Before getting to Italy, the *Louisiana* had stopped at the mouth of the Cumberland River where she took on a cargo of cotton, staves, and hides. She passed New Orleans, altered her crew at Norfolk, Virginia, and reached Liverpool, England. There she had loaded with merchandise bound for Italy. Moreover, she was only one of dozens of American ocean-going vessels, built of the

hardwood so plentiful along the Ohio, sailing the high seas.

Such feats dramatized for young America the great water highways of the interior. In 1811 a steamboat was launched at Pittsburgh by one of Robert Fulton's business associates. This was within four years after Fulton's *Clermont* had demonstrated on the Hudson the practicability of boats powered by steam.

Steamboats overcame the handicap that had prevented use of the Mississippi as a waterway for extensive up-current freighting. The sailing vessels formerly constructed had been navigated down the river to the sea, never to return upstream. The river steamboats were built with a much shallower draft, furthermore, in order that they could pass navigation obstacles in all seasons, not merely during the freshet time of spring. One of the most serious of these hazards was the Falls of the Ohio at Louisville. Here the river, otherwise with a clear channel, had cut a new course during the Ice Age, and encountered a ledge of hard limestone over which it dropped twenty-six feet within two miles.

After the War of 1812 the route of the Ohio River was crowded with settlers coming to the Old Northwest. Many of these were people from the Middle Atlantic States who came to advance the frontiers which had already been established in Indiana and Illinois by those ubiquitous pioneers from Kentucky and Tennessee. The tide of migration here was fully as high as that moving along the Gulf Coast at the

same time. Mississippi and Alabama, Indiana and Illinois, all came into the Union between 1816 and 1819.

Because the routes clung to the Ohio and other Mississippi tributaries, settlement moved west more than north. The frontier did not for quite some time cross over to the narrower drainage basin of the Great Lakes. That area remained to be occupied from another route. When Ohio, Indiana, and Illinois were organized as states, their northern halves still had not passed beyond the frontier stage.

The soil of this northern country was different from the popular limestone-based soils with which the first settlers from south of the Ohio were familiar, but its fertility was attested by the continuation over most of this Old Northwest of the dense Atlantic hardwood forest. The rainfall diminished toward the Mississippi, but it was ample. The climate in general was like that to which the settlers were accustomed, differing only in that it went to greater extremes, hotter in midsummer, colder in midwinter.

No single economic force, like that of the demand for cotton in the Southwest, dominated the movement of people into this region. It is true, however, that behind the northward removal of many Kentuckians and Tennesseans rested the pressure of the slave-plantation economy. By buying up small farms from those who had cleared them, the large landholder compelled the displaced settlers to move on unless they wished to compete with Negro labor.

The simple truth about the settlement of what be-

came the Middle West was that land was dirt cheap. As the population in older settlements became denser, it was easier to get a good farm, or begin a career, or make a new start in life in the new country. Migration into this region was more complex than that into the lower Mississippi. This is illustrated by the large number of experimental communities, of which the famous settlement by Robert Owen, the British socialist, at New Harmony, Indiana, was only one and by no means the most successful. Lest it be assumed that all of them ended in failures, reference should be made to the colossal success of the Church of Latter-Day Saints or Mormons.

As the frontier moved up the widening wedge of land between the Wabash and the Mississippi Rivers, the vast hardwood forest showed the first signs of thinning out. The Anglo-American pioneer began to encounter a kind of country which was new to his experience. For it he adopted a name from the French pathfinders: "prairie," meaning meadow or grass land. In central and northern Illinois the forest was displaced by an eastward embayment from the sea of grass that occupied almost all of the plains west of the Mississippi. Trees hugged the river bottoms, and their occurrence was sufficiently uncommon to warrant comment. "Grove" was often part of the name of early settlements in the northern half of Illinois.

Why the forests ended where they did is not completely understood. In large part it resulted from the

decrease of rainfall to the westward. But the great eastward indentation of treeless prairie across Iowa and Illinois could not be caused by lack of moisture, and must be ascribed to a variety of geological and climatic conditions. The hardwoods which stood in unbroken array to the east and south could not gain a dominant foothold in the swampy, poorly drained, and recently glaciated land south and southwest of Lake Michigan. Although rainfall and terrain were suitable for the growth of the pines which grew so thickly only a short distance farther north, the wet clay soils of this area were not to their liking. Furthermore, this area, while normally humid, occasionally was subject to severe drouths. These were not felt so severely in the higher lands of the Ozarks to the southwest, or in the northern forests, which always possessed a reserve of moisture from thick winter snows.

Numerous travelers recorded the exhilaration with which for the first time they emerged from the silent, gloomy grandeur of the forest into the gay, sunny profusion of a prairie. Here there was a sense of earth that had been obscured by the maze of tree trunks, a hankering for the long-hidden horizon. These grasslands were neither flat nor hilly. They rose and fell in easy, graceful slopes, which poets then as now compared with "the long heavy swell of the ocean, when its waves are subsiding to rest after the agitation of a storm."

It needed only to be plowed for a crop. For two

centuries the only way to get a new field had been to cut and burn it out of the forest. It took a long, back-aching life of girdling, of felling, of cutting, and of grubbing, really to rid a farm of its trees. Here was land already cleared.

But those first farmer-pioneers in Illinois, the Hoosiers and Kentuckians, thought they knew better than to take prairie land. To their knowledge, if trees did not grow, something was wrong with the soil: until they reached the true prairies that rule of thumb had been a good one. Trees were a necessity to them. Even if they were given a perfectly clear farm, they still needed timber for fences, homes, barns, furniture, and tools. They may also have sensed the moderating effect of the woods on the climate: how homesteads in or near the forests were noticeably cooler in the midsummer; how the velocity of the winter winds was slowed by the trees' shelter; how dews and fogs formed over woodland fields, saving them from late spring frosts and early frosts in fall and from damage by hail in the summer.

Occupation of the prairie required the invention of new tools. Though there were no stumps to avoid or hidden tree roots to break the harness of the plow team and snap the plowman's patience, the sod was stubborn before the plowshare. A special breaking plow was needed to cut through the thick grass mat. Beneath much of it the soil was a compact, sticky loam that stuck to the mold board behind the plowshare, so that it became dull, like a cake knife with

frosting clinging to the blade. After the crops came up, livestock must either be fenced out of the grain fields or fenced into pastures. But timber for rail fences was too scarce.

Yankee smiths contrived suitable plows, and a Yankee college professor proved that adequate fencing was furnished by the Osage Orange Hedge, the spiked precursor to barbed wire. For now the Yankee also began to pioneer the interior plain.

The easiest and most direct natural highway stretched from the back door of New England along the Mohawk River. It flowed in a long depression that extended most of the way from the Hudson to Buffalo on Lake Erie. Except for a slight ridge it was a well-graded highway not far above sea level. It had been formed by the waters flowing seaward from the Great Lakes during that part of the Ice Age before the more precipitous channel at Niagara was cleared.

By the end of the eighteenth century the political obstacles against use of this easy trail were removed. The French had been eliminated; the powerful Iroquois had been pushed out of the way, and the last British outposts tardily withdrawn to their own side of the lakes. Already in 1796 a company of Yankees was settling along the south shore of Lake Erie in the so-called Connecticut or Western Reserve of Ohio.

The Yankee movement to the interior did not become full-sized, however, until after 1825, when transportation was even easier. The improvements

first consisted of digging canals from the narrow drainage basin of the Great Lakes across the low watershed where rose the tributaries of the Hudson in the East and the branches of the Ohio and Mississippi in the West. The first of these was the Erie Canal. It was so useful and profitable that it brought on an era of canal construction. In the West the most important and successful were the Maumee-Wabash and Illinois-Michigan Canals, which like the Erie followed the valleys of ancient outlets for the glacial Great Lakes.

Unfortunately for the adequate development of our inland waterways, many of the projected canals were never completed, or when completed, not given a fair trial. They suffered almost at once from competition by the much more novel and exciting, but not always wiser, development of the railroads. Like other plentiful resources their development depended upon the whim of the wasteful present, which had little heed for the needs of posterity.

The completion of the Erie Canal in 1825 made it easier for Yankees to go west but also made it harder for them to stay at home. The cheaper freight rates made it difficult for the naturally less fertile and more worked-out farms of New England to meet the prices at which grain was brought in from the Great Lakes and Mississippi basins. Even Yankees one generation removed into northern New York could not compete, unless they lived within twenty-five to fifty miles of the Erie Canal. The only way to

make these older farms bring in cash was to produce wool for the growing textile industry of the Northeast, or supply dairy products for the increasing populations of the eastern cities. Because raising sheep and cattle required large acreage for pasture, many a New England farmer was tempted to sell his tilled fields to some one who would let them grow up in forage. The former owner then had his choice of going to the city, where he would have to live by and compete with growing numbers of immigrant laborers, or of setting out for the West.

The transplanting of New Englanders to the West very often had a method and a plan about it that did not characterize the transfer of settlers from the Middle and Southern States. Instead of going as separate families in single pioneering ventures, the Yankees organized companies which planned new communities in the West before pulling up stakes in the home neighborhood. First a committee, or perhaps several of them, searched for land, located it, and purchased it. The projected settlement, with its church, school, mill, and grocery all prearranged, then moved West. Many communities in Illinois, northern Indiana and Ohio, and Wisconsin and Michigan originated in this way. Some of them fulfilled their expectations with surprising faithfulness.

By 1840 the number of persons going west past Buffalo to the now interlocked Great Lakes-Mississippi waterway, approached a hundred thousand in one year. A significant number of these were not

Yankees or any kind of native American. They were the van of a great wave of European immigrants.

The Congress of Vienna in 1815 brought an end to forty years of revolution, war, and political instability, during which the flow of immigrants to the New World had been negligible. During the thirty years of relative peace which followed, immigration revived and swelled to vast proportions. Unfortunately, the very good beginning which it made immediately after the peace settlement was within three years arrested by the American Panic of 1819. This was an economic depression brought on by too rapid sale of public lands in the West—a sale made possible by the careless credit policy of the government and private banks. Immigrants found themselves stranded in a strange country whose vaunted opportunities were tragically restricted. Disillusioned by pessimistic reports, prospective immigrants turned for a few years to other lands of promise such as Russia and Brazil. It was not until about 1830 that the migration to the United States was really resumed. Thereafter, until the Civil War, the number of European new-comers remained large.

Like the Yankee whose westward movement he paralleled, the European alien was not trained to frontier technics. If he settled in the woodland it usually was on a farm already cleared, the owner of which had probably moved on to a more savage environment. Only on the prairie, where the creation of a farm was simpler, was the immigrant himself

often the pioneer. Furthermore, by the time the grasslands were being settled, movement was easier. The nation was making rapid strides in the development of transportation through steamboats, canals, railways, and even better roads. A wagon could be driven across virgin prairie, whereas only packhorses had been practicable in virgin forest. Therefore a prairie farm while still very new might market a surplus of grain, while a backwoods clearing was often for years isolated and almost entirely self-subsistent. On the grasslands beyond the Mississippi the railroads were often built in advance of actual settlement. To increase their own tariffs such railroads were active colonizers of native and foreign migrants along their rights of way.

An important feature of European immigration before the Civil War was the avoidance of the South. Though the currents of ocean and wind still opposed direct shipping between Europe and the northern part of America, these were largely overcome after 1838, when the first steamship crossed the Atlantic. There still remained the fact that commercially the South was more closely tied to Europe than was the North. In fact, the two chief points on the continent for embarkation to the United States, Le Havre and Bremen, were respectively the chief continental marts for American cotton and tobacco. The weight and size of the manufactured goods carried from those ports back to America was so small that shippers were willing to carry immigrants as a kind of

ballast. Passenger fares were therefore very cheap. Because of these commercial connections, Le Havre to New Orleans and Bremen to Baltimore were very common voyages for the German immigrant of this period. But instead of going into the tobacco border states from Baltimore or to the cotton south from New Orleans, he usually passed on to the farmlands of the northwest. He was not wealthy enough to buy plantations or slaves, and the climate of the South was too unlike that of the country from which he came. In the north there also were more cities in which to pursue a handicraft or profession.

The Germans who settled in the new cities of the west such as Cincinnati, St. Louis, or Milwaukee added to the urban culture highly desirable features of the more mature European civilization. When as was more often the case they took to rural life, they likely proved to be better farmers than the Hoosiers or Yankees. The last was also true of the Scandinavian immigrants.

Before the Civil War, however, the largest number of foreigners still came from the British Isles. The greatest single wave of these was composed of the Irish, who came during the middle and late forties. Their arrival was the consequence of a tragic famine that resulted from failures of potato crops upon which the Irish peasantry had become much too dependent. Though Scotch and English immigrants were likely to take to the land, the Irish were not. If they left the cities it was usually as construction

laborers on the rapidly expanding canals and railroads.

The English and Scotch, along with native Anglo-Americans, were able to equip their co-pioneers from continental Europe with one tool especially fitted to the task of overrunning a continent. That was home-made government. Dramatic emphasis on the beauties of English freedom has often distracted from the decided practicability of its law. This has been particularly evident when it has had to withstand the strain of distance from seats of established authority, the stress of a moving society, and the obstacle of unprecedented environment. Juries and legislatures may now be *rights* but they began as *duties* imposed upon ordinary men by English monarchs with a flair for political efficiency. After centuries of experience it was therefore second nature for an Englishman to handle his own governance. He was no child who had to wait for a parental government to open legal gates, quell property squabbles, select team captains, or determine the rules of the game. These matters Englishmen could manage for themselves anywhere. The Dutch, Germans, Scandinavians, and others who joined them learned their ways quickly. The Irish learned it much better here than in Ireland.

The diversity of all these nations was blended into one by "nationalism," a social chemistry which defies exact definition. Certainly it was not then, nor is it now, a rational formula deduced from hard facts

like geography, economics, and well-established traditions. For nationalism will bind men together without and even despite such facts. It is not so much reason as emotion, an emulsion of sentiments such as common prides and prejudices, mutual fear and humiliation, shared glories and aspirations—a poetic fallacy, persisting from the Romanticists of the early nineteenth century, who first personified the utensils of politics and finally deified them.

This is not to deride or deny. The Duponts from their bag of mysteries can summon no genii who will exceed in the stark strength of their reality the force which cleaves apart two nationalities along the thousand open miles of the 49th parallel, yet binds Denver and Los Angeles together across three mountain ranges in a thousand miles of desert. Men who to-day are restive under the intolerance which constricts rather than fulfils their love of country must recall that in the nineteenth century, both in Europe and America, nationalism was an enlarging and stabilizing force.

CHAPTER FIVE

"The Twain Shall Meet"

THE Pacific confounds our senses of direction. Its western side is the Far East, but the eastern side is our Far West: the land of the Rising Sun is where it sets.

Americans can face the problem of the Pacific much more intelligently if they correct two common historical errors. First, the development of the United States was not a continuous process westward. It faltered after the organization of a single tier of states west of the Mississippi. The Dakotas did not come into the Union until forty years after California; Oklahoma not till fifty after Oregon. Second, Americans in considerable numbers did not first reach the Pacific Coast by an overland route, but from the ocean. The Golden Gate is no more a back-door to America than is Long Island Sound a side entrance.

Let us state a proposition in human geometry. Given a triangle with points A, B, and C. Point A is the harbor of San Diego, California, very near our boundary with Mexico. Point B is the western termination of the 49th parallel which "separates" us from Canada. Between A and B, our Pacific coast covers

over seventeen degrees of latitude, or about one thousand miles of distance. Point C is the port of Honolulu in the Hawaiian Islands: the apex of the triangle. To this apex from the mainland base it is almost forty degrees of the earth's circumference, twenty-four hundred miles of water. Here is the longest stretch of ocean in the world uninterrupted by any stepping-stones.

But once Hawaii has been reached, the rest of the Pacific Ocean can be navigated from island to island by rather convenient cruises. The Hawaiian Islands themselves stretch fifteen hundred miles northwest. One of the utmost of these bears the very significant name of Midway.

On the coasts and islands touching the triangle described above, the interests of the United States were so substantial by 1823 that they were covered by the first paragraph of the Monroe Doctrine. At that time there was no city of Chicago; the exact source of the Mississippi River was still uncertain, and no American had reached California by an overland route. Nevertheless, Yankee skippers knew the California-Orgeon coast-line almost as well as they did that of their native New England.

It came about in this way. After the American Revolution, the shippers and merchants of New England found themselves excluded from the marts and ports of the British Empire. It was too late then to remember on which side their bread had been buttered, and the rebellious sons had to make a living

in their own ways. Among the lucrative business openings which they found were those on the Asiatic side of the Pacific and in the Indian Ocean. Salem ships in particular developed a trade around the Cape of Good Hope (southern tip of Africa) with India and the East Indies. Boston specialized in a trade around Cape Horn (southern tip of South America) with China.

For the products of China—silks, tea, and porcelain—they found a ready and profitable sale in the United States or even in Europe. But at first the American traders were badly handicapped by lack of goods which the Chinese would take in exchange. They could offer only ginseng, the root of an American weed, which was highly prized in China for its supposed medicinal values. A more substantial basis of trade must be found.

The problem was solved by Captain Robert Gray in what was the first American circumnavigation of the globe. He left Boston in 1787, and after rounding the Horn spent one and a half years along the coast of Oregon and British Columbia. Here he picked up a cargo of furs, which were traded in China for Oriental goods which he carried home to America by way of the Indian and Atlantic Oceans. On a second voyage, in 1792, Gray discovered the Columbia River and named it after his vessel.

An essential stopping-place on this cruise for Gray and his successors was the Hawaiian Islands. Fresh food and water were secured, the sailors rested, and

the vessels were repaired. The stop-over also became a source of profit to the enterprising Yankees, for the sandalwood which grew wild on the islands was highly prized by the Chinese.

Canton, China, with which most of the early trade was conducted, was one of the world's chief fur markets. The Chinese wore heavy clothing both indoors and out, for their dwellings lacked means of heating. Fur garments were cherished from one generation to the next. Here was a vast market for the fur resources of the American coast. Most highly prized were the large, beautiful pelts of sea-otters, which were abundant along Lower and Upper California and on up the coast to the Aleutian Islands. Next to the sea-otter in importance was the seal which abounded in the same waters and along the same shores. The profits were tremendous. One lucky trader secured eight thousand dollars in furs from the Indians in exchange for a rusty iron chisel. For three decades this remained an extensive, important American traffic.

The hunters of these amphibian mammals were succeeded by other Yankees seeking the more completely aquatic whales. As a result of reckless exploitation, the volume of the sea-otter and seal furs carried to China began to decline after 1820. Then whaling in the Pacific became a major American industry.

By 1820 the American stake in the Hawaiian Islands was clearly apparent. Every year it was visited

by two thousand American seamen engaged in the China trade, a trade which amounted to almost twenty million dollars annually. An American official resident was appointed to look after American interests. American whalers were already calling regularly for repairs and supplies. By the forties, four hundred whaling ships touched there annually. During that decade the preëminence of American influence on the islands was exemplified in the person of the king's chief minister. He was an American missionary, one of the considerable number which had started to arrive in 1820. In 1843, to clinch the American hold, Daniel Webster, Secretary of State, said hands-off to any nation that might have designs on the islands. Many Americans were already including them in their concept of our manifest destiny.

Both the China fur trade and the Pacific whaling industry virtually became American monopolies, and gave the United States a toe-hold on the mainland. In hunting and trading for sea-otter and seal, it was necessary to learn the California and Oregon coasts well. The Spanish of California, furthermore, became dependent upon manufactured goods from the New England fur-traders to whom they sold food. The whalers also bartered for supplies in the California Spanish settlements and used the coastal harbors for repairs. In addition, a brisk trade in cattle hides developed between California and New England. By 1840 it involved more than fifty vessels along the coast, stimulated the California cattle industry on the

one hand and the New England boot-and-shoe business on the other. Where such substantial American commercial interests existed, an American political concern had followed. By the time Americans attempted to reach Oregon and California overland, their resources were already well known.

Discovery of a gap through the Rocky Mountains which could be used by the overland migrants to California and Oregon was delayed until 1824. By this time the China fur trade was more than three decades old, the Pacific whaling industry well established, the California hide business beginning, and the American domination of the Hawaiian Islands underway. That gap was the South Pass. It sliced through the Rocky Mountains at their lowest point, in what is now central Wyoming. It lay where the Sweetwater River, hurrying to join the North Platte, curved athwart the eastern end of the Wind River range before straightening its course eastward. There was a broad shallow corridor floored with soft stream-laid rocks which partially buried the old blunted ranges on either side. The notched crest of one of these, riven by the winds and frost and sun of a million years, was a victorious sentinel to the weary travelers. For just beyond Split Rock lay the South Pass, which meant that half the long journey lay behind them.

Routes more devious than that through South Pass had been used previously by official explorers and

fur-traders. But the trails of adventurers, trappers, and packhorses would not suffice for large-scale migration with wagons, cattle, women, and children. It is to the fur-traders, however, that these later travelers owed most of their knowledge regarding the geographical details of that third of the United States lying between the Rockies and the Coastal Ranges. It was such a fur-trader who discovered South Pass itself, and it was a partner of his who, two years later, first reached California by an overland trail.

These American fur-traders must not be confused with those who operated in the coastal waters of the Pacific. They came not around the Horn from Boston, but up the Missouri River from St. Louis. Instead of seeking the sea-otter and seal in the salt water of the Pacific, they hunted mainly for beaver in the fresh-water streams of the mountains. The first to exploit the rookeries of the sea-otter and seal had been Russians coming by way of Siberia and the Bering Sea. But the ponds and burrows of the beaver in the Pacific Northwest were first robbed by Britishers who came across Canada from Hudson Bay. With the Russians the Americans made a deal that gave the latter a virtual monopoly of the Pacific trade. From the British the Americans continued to suffer such severe competition that they came off second best.

The sovereignty over the Pacific Northwest was left unsettled for thirty years by a treaty made with

Great Britain in 1818. The United States agreed that the Oregon country should be jointly occupied by both nations. Neither was to have preference in trade or settlement. The entire area, including the valleys of Puget Sound, the Columbia River, and its tributaries, the Willamette and the Snake, was actually dominated by the British Hudson's Bay Company. Hundreds of its trappers brought in the annual beaver catch from thousands of water courses. It also fostered the beginnings of agriculture in order to supplement the supplies which came by way of the Pacific. Fields and gardens were planted around Vancouver and in the Willamette Valley. Cattle were brought up from California, and hogs shipped from Hawaii.

Though the monopoly control of the British Company was firm, it was just and reasonable. When the American missionaries, and later other overland migrants, finally began to arrive, they were treated fairly and even benevolently. Some such outpost was necessary to receive persons who had walked and ridden two thousand miles.

It was not until 1843 that the overland migration to Oregon really began. Two conditions must prevail before the long trek would be undertaken by men without the exceptional motives of traders and missionaries. The travelers must be equipped with purposes strong enough to reach from the Mississippi Valley frontier to the Columbia River, spurning all the land between. The route must be sufficiently

well established for families to start out with confidence.

The man who in 1824 discovered the South Pass was not headlined in the newspapers, banqueted by geographical societies, or even given an honorary degree by a college. Even if the people of the Mississippi Valley had learned about it immediately, there was no reason why they should have become excited. The line of settlement reached across the great river only in Louisiana and Missouri. Northeastern Ohio, northern Indiana and Illinois, all of Michigan, Wisconsin, Minnesota, and Iowa were still unoccupied except for isolated trading and military posts.

It was then, in fact, the plan of the federal government that all the present states of Oklahoma, Kansas, Nebraska, and the Dakotas, and almost all of Iowa and Minnesota, as well as the northern part of Wisconsin should be reserved permanently for the Indians. Arrangements were made with the Indians east of that area to remove them to it. Treaties were sealed with a solemn promise that the Indians would never again be compelled to give up their new homes. All white persons without special license from the government were forbidden to trespass on the Indian Country. Except for the reservation in Iowa and southern Minnesota, all the large territory thus closed to future settlement by farmer frontiersman was actually unsuited to prevailing agricultural techniques. In northern Wisconsin and Minnesota the glaciers, less beneficent than in Indiana and Illinois,

had scooped and dumped their gravel and boulders in a very disorderly pattern. Left behind were soils of irregular fertility, and a terrain with its drainage interrupted and littered with lakes and swamps. To the west the Indian Country mostly included an area where rainfall was first uncertain and finally insufficient, either for the general farmer of the North or for the cotton planter of the South. The fur-traders and missionaries who outlined the overland trail to the Pacific were trespassers all the way. Beyond Missouri on to South Pass in the Rockies they were in the Indian Country. If they turned southwest from that point they intruded on Mexican soil. If they went northwest instead, they had as good a legal right as any one, but in effect they were traveling in territory where the most effective authority was that of the British Hudson's Bay Company.

Such distinctions of proprietorship did not distress the overland pathfinders. The trail developed segment by segment. During the middle thirties particularly, British and American fur-traders and American missionaries planted the posts which were necessary havens or stop-overs. These were most numerous where most needed, on that western half of the Oregon trail which was the most difficult to traverse, because it ran through mountains and arid inter-mountain basins. By 1843 the route was ready for the great migration. It began at Independence on the Missouri River, because near that place the river's course ceased to be west and bent instead to

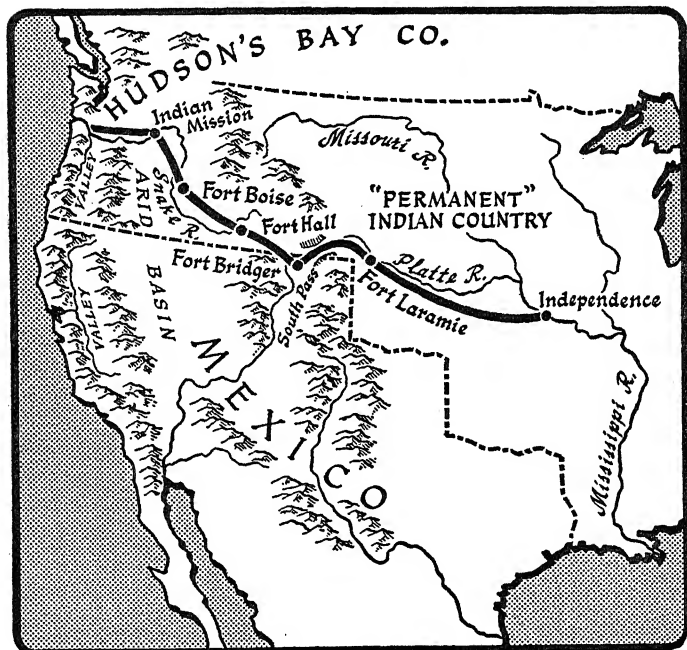
the north. The trail cut over the plain to the Platte River, and followed its valley, including the North Platte, all the way to the mountains. Travel was rather easy along this part of the trail. For the first few days it lay over a rolling grass- and flower-covered prairie, and later over the higher and drier plains, where the grass was short and often gray or brown instead of green, but able to sustain the cattle and draft animals.

The trail left the rolling plains for mountain country near Fort Laramie, one of the posts established originally for fur trading. Without realizing it, the pioneers had at this post already climbed more than three thousand feet. Hereafter the incline was steeper and rougher. At Fort Laramie was the last chance to overhaul and repair the wagons. Not until the mountains had been entered and the continental divide crossed and descended to Fort Bridger, four hundred miles away, would there be another opportunity to get help or supplies for repairs.

After Fort Laramie the route continued to follow the North Platte until its tributary, the Sweetwater, finally led the way to the South Pass. This twenty-mile-wide opening in the mountains was so gradual that the travelers could not tell, exactly, where they crossed the divide separating the rivers of the Atlantic from those of the Pacific. The descent into the valley of the Green River and Fort Bridger was relatively easy.

Like all the other "forts" originally found along

the trail, Fort Bridger was not a military station but a fur-trader's post. It lay at a point very nearly half-way between western Missouri and the Willamette Valley of western Oregon, the destination of most of



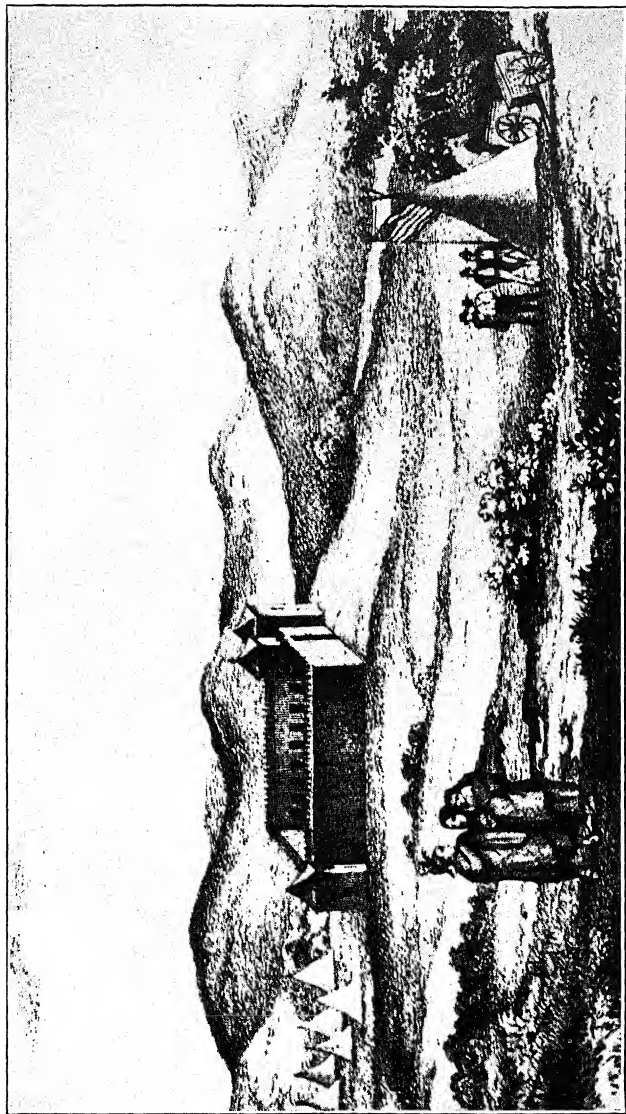
The country traversed by the Oregon Trail during the first years it was used.

the early migrant trains. During the first three years of the Oregon boom it still lay in Mexico. In fact, among the first numerous settlers about Fort Bridger were the Mormons, who had come west with the de-

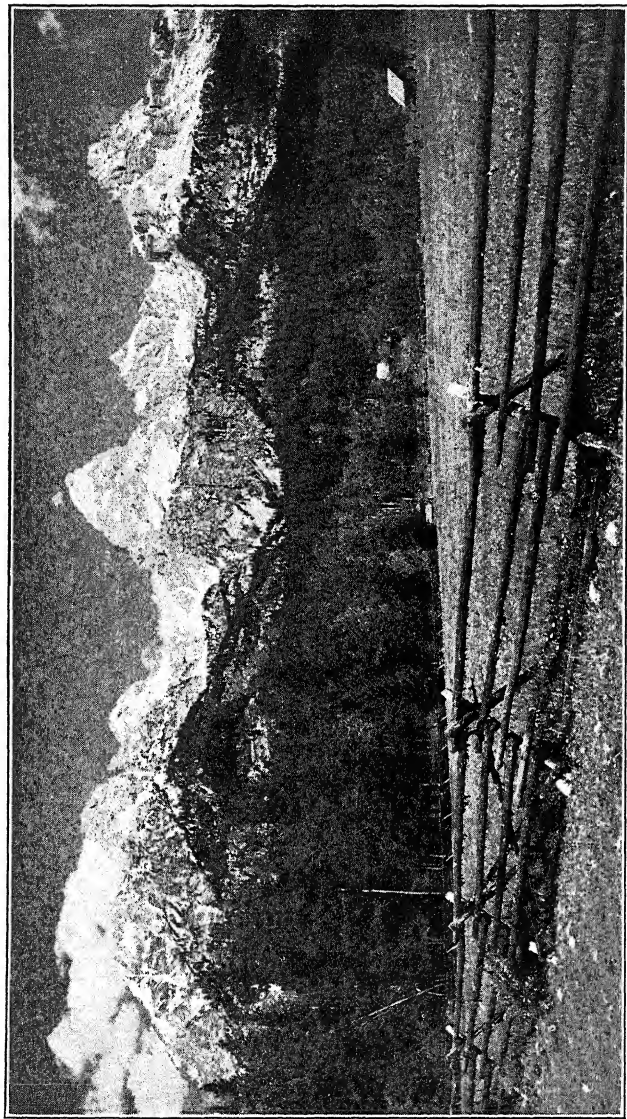
liberate intention of getting outside of those United States in which they had been given no proper protection against persecution. At Fort Bridger there was a smithy for wagon repairs. The Mormons, who were willing to settle in this unattractive arid basin, made a good business out of trading with the Gentile wagon trains, to the handsome profit of the former and for the needs of the latter.

From Fort Bridger the trail went northwest to reach the Snake River valley at Fort Hall. An arm-chair pioneer will at this point notice on the map that the Snake runs through a broad plateau to the Columbia River and thus to the Pacific Ocean. From here on the route seems obvious. If he concludes that the worst of the journey is over, however, he is dead wrong. Indians avoided it, but that was because game was scarce. The country was barren. The river ran in a cañon too rugged to follow, too rough to navigate. Water was hard to get, for even if one traveled along the river on the plateau above, it might be a day or two before a place was found where the gorge could be descended. Beyond Fort Hall the only remaining station on the Snake was Fort Boise. After that came the most difficult part of the journey. Wagons, instead of being a help, were likely to become a burden, though after 1843 they were generally driven at least as far as the Whitman Mission near the spot where the Snake joins the Columbia. Thence rafts and boats could be used.

What purpose could propel, what need could jus-



Fort Laramie . . . hereafter the trail was rougher and steeper.



The Tetons . . . "glaciers gnawed at their flanks."

tify such a journey? Were these dreamers and fools who would go farther in four months than the American frontier had advanced in two centuries? What was there in Oregon for the common farmers who had never harpooned a whale, slaughtered a seal, hooked a salmon, trapped a beaver, or in God's name captured an Indian's soul?

Half of Oregon is part of the Great American Desert. This is the great arid basin lying between the Rockies and the double line of the Sierra-Cascade and Coastal Ranges. These shut out the moisture from the Pacific Ocean and cause a desert basin which begins below the Mexican border and extends into central Oregon. North of it, and almost walled about by mountains, is a dry lava plateau, which because it lies somewhat higher receives a little more rain, enough for bunch grass and sage-brush, often sufficient for sparse pastures. More than the basin to the south it is spotted with mountains, which are higher and catch enough rain for better upland grazing. Sometimes there is enough for trees. At best, however, this plateau area may be described as semi-arid.

The overland trail led not to these discouraging lands, but through them. For the immigrants were heading for a greener valley on the farther side of the rain-catching Cascades and Sierras. The valley lies between these and the much lower Coastal Ranges. It is divided into a northern and southern part by the Klamath Mountains which connect the

Coastal Ranges and the Sierra-Cascades in northern California. In California this valley is drained by the Sacramento and San Joaquin Rivers. In Oregon the Willamette River flows through it to the north until it empties at right angles into the Columbia. In Washington, the valley continues as a depression that finally slopes underneath Puget Sound. Because the mountain wall on the east is higher than that on the west, moisture-bearing winds from the Pacific deliver rainfall to this valley. Unfortunately, in California most of it comes at the wrong time of the year to grow crops—that is, in the wintertime. Happily, in the Willamette Valley and Puget Sound, the climate is moist as well as pleasant in the summertime. It was to the Willamette Valley in particular that the first great overland migration came. It was an excellent land for general farming. There the pioneer from Missouri, Illinois, and Ohio could find a country like home—humid, smooth, and fertile.

It was true, then, that two thousand miles away there was a green valley tucked between the mountains. One could get to it by traversing the dry and drier Great Plains, climbing over the Continental Divide, crossing an arid basin, laboring across a semi-arid plateau, and descending the Columbia River through its gorge in the Cascade Mountains. Was there a need to do this? Hardly, for any one able to appreciate the good black dirt remaining in Iowa and southern Minnesota, or the fine soil that was being discovered in northwestern Minnesota

where lay the bed of an ancient glacial lake, now the valley of the Red River of the North.

But an Oregon Fever seized hundreds of people as the spring of 1843 approached. Some were distressed because the hard times beginning with the panic of 1837 were lasting overlong. Others had been stirred by tales of exploration which had been written about the Far West. Some were sincerely moved by the truly dramatic missionary ventures reported from their pulpits or related in their denominational magazines. Many were excited by growing resentment over Great Britain's claim to Oregon. A goodly number were affected by all these moods, and convinced that they ought to go when they learned that a party of over a hundred men had actually set out over the trail in the spring of 1842.

May, 1843, a company of almost a thousand persons, with one hundred and twenty wagons and more than five thousand cattle gathered at Independence, Missouri, from all parts of the Mississippi and Ohio Valleys. Theirs was the first great migration to Oregon, which they reached in October. The next spring fourteen hundred set out; in 1845, nearly three thousand.

If Oregon really needed to be saved from Great Britain it was now done. The temporary government established by a small number of Americans in 1843 was now backed by a substantial majority of the inhabitants. The Hudson's Bay Company officials, at first hostile, submitted to its protection. By way of

the Hawaiian Islands and Mexico the news of American preëminence was promptly transmitted to London through persons no less than a son of Britain's Prime Minister and a brother of her Secretary for Foreign Affairs. In 1846 the British government agreed to what it had once refused, namely that the sovereignty of the United States should extend to all the country south of the forty-ninth parallel of latitude.

Many Americans had wanted to fight for everything up to fifty-four degrees and forty minutes. That we did not was well indeed. For when the treaty with Britain was concluded, we had already been at war with Mexico for more than a month. Whether under the circumstances we could have held the far-flung settlements of the Pacific Northwest against the might of the British Navy in the Pacific is extremely doubtful. As it was, with our hands free, we successfully detached California from Mexico, and all the land between it and Texas to boot.

Even if there had been no Mexican War, the Americans in California would probably have succeeded in wrenching the province from the disabled Latin republic. American merchants, sailors, and fur-traders were after 1840 joined by small parties of overland immigrants. These were men and women who, instead of adhering to the main stream that ran to Oregon, turned southwest at Fort Hall, or even earlier at Fort Bridger, and crossed the desert basin

and the Sierras into the inter-mountain valley of the Sacramento River. The outpost in northern California which marked their safe arrival was a fort and ranch near the juncture of the American and Sacramento Rivers. Armed with forty pieces of ordnance purchased from an old Russian colony of the sea-otter trading days, this fort dominated the menacing Indian tribes and discouraged any disposition of suspicious Mexican authorities to prevent the intrusion of overland migrants on California soil.

This strategic establishment on the north California frontier was the creation of John A. Sutter. Significantly, he had been aided in undertaking this enterprise by Americans resident in the Hawaiian Islands, and he was assisted in building it by native Hawaiian laborers.

Two weeks before the peace treaty ceding California to the United States was signed, one of Sutter's employees made that famous discovery of gold which definitely turned the main tide of migration away from Oregon to California. It would be narrow-minded, however, to think of the great gold rush of the next few years as entirely an American occurrence. Though tens of thousands came overland across the mountain-desert trails radiating from South Pass and Santa Fé, they came also in tens of thousands around the Horn, over the Isthmus of Panama, and out of the Pacific Ocean. They came in ships which as often as not set out from non-American ports. These brought not only Europeans but

Hispanic-Americans from Mexico, Peru, and Chile, where mining for precious metals had been a business for centuries before Columbus.

In the single year of 1852, they brought also eighteen thousand Chinese, a number half the size of San Francisco, the port where they debarked. Already at that early date white miners exercised that brutal discrimination against them which before long was to darken the relations between the United States and the other side of the Pacific. Such relations were now becoming even more important, for 1852 was also the year that an American naval squadron under one Commodore Perry was sent out to pry open the hermit empire of the Mikado. And on the Hawaiian Islands the Americans were manoeuvring the king into a position where, within a few months, he was to seek annexation to the United States in order to save his throne.

The acquisition within two years of all the Pacific coast from the mouth of Puget Sound to the Peninsula of California, and of many more thousand square miles north of the Rio Grande River, found American politicians with no plan ready for its incorporation into our political system. Establishment of a federal government in Oregon was delayed for two years, until a dreadful Indian massacre at Whitman's Mission dramatized the dilatory neglect of Congress. It was necessary for the recently excluded British power in the form of the Hudson's Bay Company to come back long enough to rescue fifty whites

whom the Indians held prisoner. Political dissension also postponed, until 1850, the determination of the boundaries of the new state of Texas, the organization of territorial government for New Mexico and Utah, and the admission of California into the Union.

Deliberations over these problems were the last pathetic acts of that great senatorial triumvirate of Calhoun, Webster, and Clay, whose careers went back almost half a century to the days when the Mississippi Valley and not the Pacific Coast was coming under American sovereignty. Calhoun died in the midst of the debates. Webster left the senate for the cabinet, many of his northern admirers lost forevermore because of concessions which he had made in the new territories to the slavery faction. Only the aged Clay remained to see his last great compromise between North and South fulfilled.

One problem of the Far West that was not settled in the famous Compromise of 1850 was the making of better communications to the Pacific. Profit, as well as pride and patriotism, required that the distant settlements at Puget Sound, in the Willamette Valley, and in California, be bound to the Mississippi Valley and the Atlantic Seaboard. But the question of locating the route of communication caused irritating controversy, thereby intensifying the sectional self-consciousness of North and South.

During most of the decade before the Civil War, the administration in Washington was controlled by

the Democratic Party, in which southern leadership was dominant. Though perfectly plausible geographical reasons could be given for their favoritism to southern connections with the Pacific, their preferences were naturally suspected and resented in the North. Whatever the true merits of the case, the result was that the postmaster-general, a Southerner, established the mail service in an extreme southern latitude. He fixed the course across Texas to El Paso on the Rio Grande, thence to Tucson on the Gila. Then it ran down the valley of the Gila to where this river joined the Colorado River at Yuma. From that place there was a well-known trail to the Pacific Ocean at San Diego in the extreme southern part of California. A similar decision was made about the same time by the Secretary of War, who was one day to be president of the seceded Confederate States. He selected this same southern route as the best for the transcontinental railroad that every one agreed must be built somewhere. The surveys showed that it might be necessary to construct it within the northern edge of Mexico. Therefore, a railroad president from South Carolina by the name of Gadsden negotiated with Mexico a special treaty which purchased a strip of territory along part of the route between El Paso and Yuma. In this way, all the southern bank of the Gila River was brought under American sovereignty.

The vaunted advantages of this extreme southern connection were that it crossed the mountains in low

easy grades, and was not closed by snow in the winter. Northern opponents answered that it was too distant a route from their section, and that it ran through desert or semi-desert almost all the way. They could point out also that most of the travelers and the bulk of the freighters continued to use that more central trail from Missouri to South Pass by which California and Oregon had been largely settled.

Aside from the physical handicaps charged against this central overland route, two admitted disadvantages attended its development. It was troubled more by Indian depredations, and it had never been given territorial government. Both these difficulties arose from the circumstance that the trail ran through that region once solemnly set apart as permanent Indian country. This division had been made when the Rocky Mountains were still our western boundary, and before the migration to the Pacific had begun.

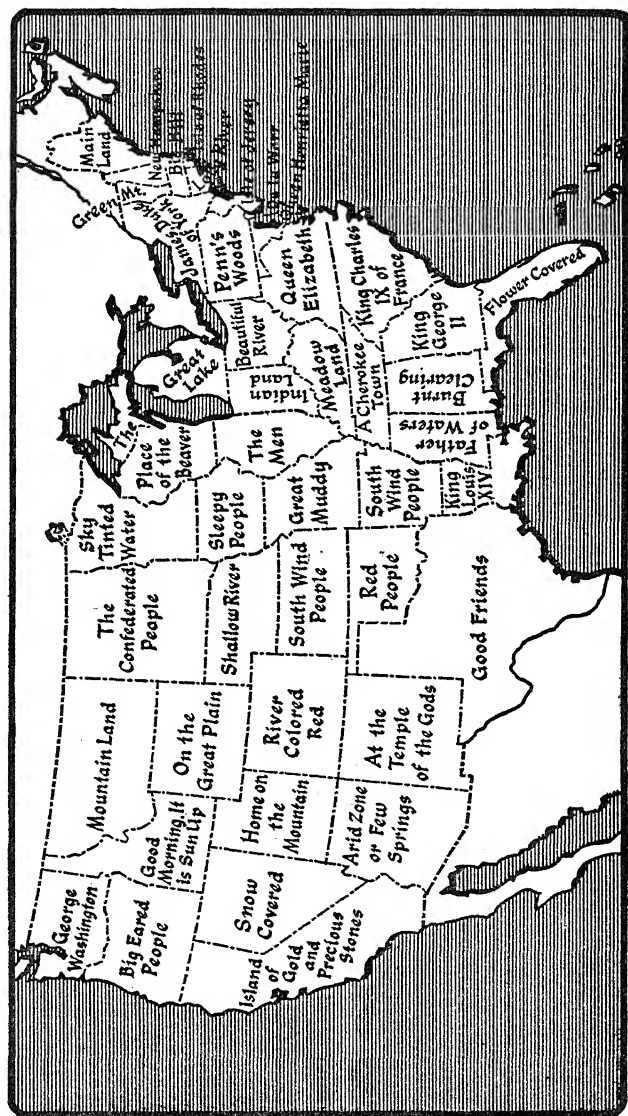
Public opinion in the north insisted that a broad belt of land for the central route be secured from the Indians. Accordingly, an Indian commissioner, conscientiously ashamed of his promise-breaking job, wangled, bought, and threatened the Indians into moving out of the way once more.

The desired territorial organization of the land crossed by the California-Oregon trail became the particular project of Senator Stephen A. Douglas. He was the rising star among the northern Demo-

crats and in many ways the best of the younger politicians who succeeded to the leadership of the great triumvirate. He had a good all-American outlook. For the details of his undertaking Douglas was well prepared, for he had recently smoothed over sectional jealousies long enough to get the first federal land grants to help construct a railroad from Chicago to the Gulf of Mexico. Furthermore, he had had long experience on the Committee for Territories of which he was now the chairman.

He brought in a bill for the organization of the overland trail country, to be called the Kansas and Nebraska territories. But, to get it passed, he had to make a concession to the South which let loose all hell in the North. There was an old rule, made when Missouri was admitted into the Union, that thereafter no slavery should exist north of thirty-six degrees and thirty minutes. By 1850 that line, thirty years old, was regarded in the North as quite sacred. It was ignored, nevertheless, in the Compromise of 1850 that organized the new land acquired from Mexico, much of which lay above that line. This had been done to conciliate the South. Now that Kansas and Nebraska were to be given territorial government also, the South demanded even more. It insisted that the line be specifically abolished.

Douglas' bill passed, and the territories were organized, but to his surprise he had touched off political dynamite. Old party loyalties in the North were blown to bits and the pieces recast in the new Repub-



A translated map of the United States.

lican party. Both North and South rushed emigrants to settle Kansas with their own partisans. The more hot-headed of these soon were engaged in a kind of guerrilla warfare which further inflamed the passions of their eastern supporters. And finally, in 1860, Douglas was defeated for the Presidency in a ragged four-way presidential contest, the winner of which was twenty per cent short of a popular majority, and received not a single electoral vote south of the Ohio River and the Mason-Dixon line. South Carolina then led the way to formation of a separate sovereignty.

With southern congressmen absent, the new Republican party was able to do quite a few things which their northern constituents wanted. They admitted Kansas into the Union as a free state. They moved the mail service to the central route. Likewise, they provided that the railroad was to reach California by way of the old emigrant trail through South Pass, and they helped to finance it in a very liberal way indeed. The names for the eastern and western parts of this "Pacific" railroad had a significance in the sixties not so evident in the present. One was called "Union," the other "Central."

The Central Pacific, which thrust its line eastward from the Pacific, had much the more difficult task. Engineering problems were less readily solved, and capital harder to get. Labor was scarcer. It was hard to hire construction hands in a country where a man might develop his own farm homestead, or prospect

for his own bonanza. Chinese coolies finally supplied the Central Pacific most of its labor. They were cheap and hard-working and created no labor troubles. At one time in its early history, sixty per cent of the Central Pacific mechanics and laborers were these "heathen Chinees." When they finally faced the Irish workers of the Union Pacific on the flat deserts of Utah, and drove the last golden spike of the first transcontinental railroad, each group had half the world behind its back.

CHAPTER SIX

"What They Wasted Every Day"

BIRTH and death have ever walked hand in hand. The paths which lead from the shadowed geologic past to the luminous present are strewn with the bones of vanished races, each of which gave way to those who came after. It was so during the pregnant century before World War I, while Europeans streamed across the turbulent Atlantic to the conquest of America. Those who came found a better way of life and a fresh vision in the new continent. But they brought death and destruction with them—destruction to the forests and minerals, death to the game and most of the Indians. A strong new nation rose from the ashes of aboriginal America.

Ever since the beginning, the dreams and schemes of the growing country had been on a grandiose scale. North America was a continent to stimulate such plans and notions into action. The largest areas on all the earth of free or very cheap land granted to free men by a benevolent government were in America. Only there could men lose themselves in endless forests, more than a million square miles of them, to carve their livelihood with an ax, a rifle, and

two bare hands. There was a democratic government, a climate almost universally favorable for farming, and a seemingly endless frontier. Was it not natural, then, for men to deal thoughtlessly with those apparently inexhaustible supplies of land, timber, and minerals? Was it not normal, under such circumstances, for few men to give thought to a national to-morrow? They were too busy carving a new nation from the wilderness. Life was too vibrant with promise, too eager with hope, too fraught with new possibilities. So, with the recklessness of unconservative youth, they used what they could, destroyed what they would, and turned again and again to new land and fresh hopes when the old seemed exhausted. In that process they cut down the forests, killed off the game, ruined much of the soil, and gutted the age-old mineral deposits. Their bequests to their progeny were a functioning nation, a unique way of life, and a continent worn somewhat threadbare by heedless feet.

This process of physical waste on a continent-wide scale was made possible not only by the national policy of free or cheap land but also by the fact that men owned both the surface of their property and the minerals beneath it. Each was his own master, and if liberty of exploitation often turned to license, it seemed unworthy of attention. The fact that a vast pride in their land through realization of these vast resources soon expanded into a high national self-confidence is the one bright spot in the entire waste-

ful carnival. During the latter decades of the nineteenth century this national spirit was the key to both foreign and domestic policy in the United States.

Prior to the Civil War, and with the exception of the industrial northeast, the United States was primarily an agricultural country. Land was the fundamental concern of most of the population. During the 1820's, before the full flood of migration had materially affected the vast unsettled areas west of the Alleghenies, it was estimated that it would take from five hundred to two thousand years to occupy America. That the task was essentially complete in less than a century reflects only in part the unprecedented rapidity of European migration. The railroad, the river steamer, and a plow to cut tough prairie sod played their part also in vastly accelerating this influx, until it became the most dramatically rapid movement in the history of humankind.

These men who invaded the wilderness desired to create homes for their families. At first, each must be self-sufficient, which meant that each family lived on a farm. So began the destruction of that mighty green forest which stretched almost unbroken to the Mississippi. The clearing of a farm under these circumstances was a long and arduous task. All work was done by hand and back-breaking labor. Many of the trees were giants, so that a man might chop and cut for two days before one was cleared away. There was no market for lumber, and no means of

hauling the huge logs away. So the tree was cut into lengths, piled over the stump, and set afire. A man could clear only a few acres each year in this manner. He planted his corn between the fire-scarred stumps, which often persisted in the fields for decades. Each year he cleared a little more, and eventually a full-sized farm appeared among the tall trees. As new settlers crowded in, this improved land increased steadily in value. A man might expend ten years of labor and sell his land for twenty times the original purchase price. With this cash in his pocket, he might again move on to the frontier. Thus new capital was constantly created for the young nation by labor and the intrinsic worth of the rich land.

It was in this way also that the great forest which stretched from the Alleghenies to the Mississippi, and from the Great Lakes to the Ohio, was felled in one man's life-time, destroyed by hosts of single axmen bent doggedly upon its downfall. Only a few lonely groves were left by the land-hungry legion. These now stand sequestered among the waving fields of tasseled corn to remind us how death walked through the forest to midwife the birth of a new civilization. Even as the farm products of the west provided disastrous competition for the New England farmer, the desires of western farmers supplied the northeastern manufacturers with a much-needed market. As canal and Great Lakes traffic joined that on the Mississippi, there arose a great shipping sys-

tem. It extended from New York far up the western tributaries of the Mississippi and brought together the raw materials of the new West and the fabricated goods and luxuries of the settled East. To the effects of this new market and increasing immigration from Europe was added the impact of the Civil War. Suddenly northern factories were called upon to equip armies. Raw materials were needed in vastly increased amounts. The machine age came to America in those fateful years. The pulse of industry quickened and deepened to a mighty throbbing. Although not really apparent for two decades, America had changed during the sixties from an agricultural to an industrial nation. By 1900 the metamorphosis was complete.

The needs of this new industry were not so varied as those of to-day, but they were critical nonetheless. Lumber and stone for construction; iron, copper, lead and zinc for machines, bullets, and weapons; coal for fuel: these were the fundamental needs. The gasoline engine had not yet been invented, and petroleum was still sold as a medicine or a curiosity. Whale oil and animal fats greased the slowly turning wheels of infant industry. Railroads were still largely restricted to the northern states. Most of the freight was still hauled in wagons, carried in shallow-draft steamboats which puffed and paddled up and down the larger rivers, or shipped in horse-drawn barges through the network of canals. Giant Conestoga wagons screeched complainingly over the rough

roads and were piloted by picturesquely swearing drivers whose lethal elongate cigars were later to become the famous "Pittsburgh stogies." But the war marked the beginning of the end for this way of life. In four years the steamboats had almost disappeared from the rivers, never to return in large numbers. Soon the canal barges were abandoned, and not long after, the Conestogas were to roll no more. The railroads puffed in their place, their progress hastened by war-pampered factories and political subsidy. It was the iron horse that completed the conquest of the West.

This machine era in American history was made possible primarily by three substances: iron, coal, and oil. Iron for the fabrication of machines, coal for the basic energy to run them, and petroleum for lubrication and additional power. It is a startling coincidence indeed that the Bessemer process for large-scale cheap iron smelting, the discovery of petroleum, and the opening of the vast iron ores of Lake Superior came within the two decades prior to the Civil War. These were the sinews which preserved the Union and made it possible for the North to conquer the Confederacy. Much of the cost, strangely enough, was paid by the newly discovered bonanzas of more precious metals in the far western mountains.

The spear-head of this industrial blitzkrieg was iron. Only minor quantities of it had been produced during the early years of the republic. The deposits,

though widespread, were small, and their yield satisfied the limited demands of the young agricultural nation. There was then no large requirement for any mineral, and few persons even suspected the unique wealth of America. In fact, the first mineral surveys were not made until fifty years after the birth of the republic. Then came the discovery of the Marquette Range south of Lake Superior in 1845. Five years later the Superior ore was carried to Pennsylvania. The opening of the Soo Canal, around the twenty-three-foot fall between Lakes Superior and Huron in the same decade, opened the way for cheap transportation by boat. Only a few years before, coke made from Pennsylvania coal had first been used successfully in the blast furnace. Now began that coupling of iron and coal which was to become the foundation of the machine edifice that towered higher in America than in any other country. A century later, in the disturbed and awful present, the ore of Superior and the coke of the Alleghenies flow in a mighty stream to the roaring smelters where they become a molten reservoir of industrial and military power.

The development of the Superior iron deposits, included in the United States by a happy diplomatic accident, was one of the wonders of the nineteenth century. They were to yield five-sixths of our total needs, which became tremendous as the use of iron and steel multiplied many-fold because of the increasing demands of the growing nation. The Civil

War, and government subsidy in particular, stimulated search for new deposits. As population increased and per capita use skyrocketed in the decades after the war, newly discovered ranges appeared in rapid succession. Following the Marquette came the Menominee to the south, then the Vermilion and Gogebic to the westward. In 1892 the first ore was shipped from the Mesabi, greatest of them all. The full significance of these discoveries can be appreciated from the circumstance that per capita use of iron multiplied almost five times from 1870 to 1900.

These iron ores which form one of the largest and richest mining areas in the world are the result of a long series of geological happenings and slow changes during hundreds of millions of years. A shallow sea covered this region for a long period very early in geologic time. The water contained iron, originally dissolved by streams from the granitic rocks of near-by land. Bacteria caused this iron to be deposited on the sea floor. There it was mixed with other sediments. These hardened into rocks containing much iron, but in such a form and in so small an amount as to be unusable in a modern blast furnace.

Then the sea retreated, and slowly operating forces folded the iron-bearing rocks into mountain ranges as high as the present Rockies. They extended as far south as central Wisconsin and westward into Minnesota. Later, as with all mountain ranges, streams

carried away their substance until only a rolling plain remained. Long afterward other seas crept hesitantly across this plain to deposit sandstone and limestone, but stayed there only for a short while. These later soft rocks were soon removed by erosion and the iron-bearing strata beneath were again exposed to the work of wind and streams, and finally to the gouging of the ice sheets. During this long interval of exposure, water worked its way downward through the rocks, dissolved and re-deposited the iron in its present, more concentrated, usable form. Some of these concentrations are far beneath the surface, but the ore of the Mesabi Range lies almost at the tree roots. The glaciers carved the weathered rock and ore, removing much of that near the surface and hiding more of it beneath their irregular deposits.

Fortunately, much iron remained. Now, in the Mesabi, giant electric shovels scoop out the soft ore in twenty-ton bites. Three scoopfuls load a railroad car. One of the pits excavated by these mechanical monsters is over two miles long and almost four hundred feet deep. The ore is hauled directly from mine to loading dock, where the capacious maws of the ore steamers eagerly await it. The loading is a marvel of mechanized ingenuity. Cargo boats carrying thousands of tons are usually loaded in only a few hours, and the record time is less than thirty minutes. From Duluth, greatest ore-loading port in the world, they sail eastward through the Soo, to make it far busier

than either Panama or Suez. Then they proceed southward to the ports of Erie and Michigan, to meet the coal from the hills of the Alleghenies.

When it is realized that the cost of this thousand-mile water haul from Duluth is less than one-fifth that of a comparable distance by rail, the real significance of the Great Lakes waterway becomes apparent. For when the extremely low cost of lake freight is added to the cheapness of mechanized mining and large-scale fabrication, the result is steel at very low prices. And cheap steel means cheap machines. Then add the American genius for mass production. The total effect is a way of life more highly mechanized than the wildest imaginings of any nineteenth-century prophet.

Although there are other iron deposits in the United States, the cheaply mined ore of Superior makes their exploitation undesirable except under special local conditions. With gigantic modern industrial units and the current urgency for capacity production of steel, the Great Lakes carriers now transfer their greatest loads in history. In 1942, ninety million tons of ore sailed to Gary, Cleveland, Buffalo, and a dozen other ports. And in so doing, it fortified present hopes and armed our visions of future freedom.

But what of the future of iron? The high-grade ore of Mesabi, so cheaply mined, is half gone. Remaining rich reserves may last twenty years. Then the price must rise and the expense of concentrating low-

grade ore must be added to the cost of steel. Almost all other reserves are far underground, where mining costs are high. Hence the future holds higher ore prices, which may translate into a lower standard of living and fewer mechanical conveniences for the common man. Although we may postpone this date by careful utilization of all scrap metal, it can not be put off indefinitely.

Fortunate it was that iron and petroleum came into their own within the same decade. For the industries of the northeast were somewhat anxious just prior to 1860. Whale oil was becoming scarce. The sturdy, fearless whalers of New Bedford and other New England ports pursuing their prey in the Pacific, Indian, and Arctic Oceans, found it more elusive and farther afield each year. Animal fats were unsatisfactory to lubricate the wheels of busy factories.

First whale-oil lamps were replaced by coal-oil. Then Yankees found the lubricating value of petroleum. The search for oil began. Known as "Seneca oil" and used as an unpleasant-tasting medicine by the credulous, oil had previously been skimmed in small amounts from the surfaces of streams and springs or imported from Europe. Once or twice buried deposits had accidentally been tapped by well-drillers searching for salt water in the hills of Kentucky and Pennsylvania. But no actual attempt to drill to underground deposits of oil had ever been made until the year 1859. In that fateful summer,

Colonel Drake began to drill beside an oil seep along the banks of a small creek near Titusville in western Pennsylvania. When his well struck oil, it solved the lubricating problems of an expanding industry and marked a new era in the machine progress of western civilization.

Drake's equipment would seem crude even to the farm well-driller of to-day. His well was only seventy feet in depth and produced about twenty barrels of oil the first day. To-day, eighty years later, men have drilled down almost three miles, and by cunning devices can contrive to guide a drill in any direction. Now derricks tower almost twice as far above ground as Drake's well penetrated below. Marvelously ingenious equipment can drill the equivalent of seven of Drake's wells in a single day. In the eight decades after his well was completed occurred the amazing rise of the petroleum industry with its astounding impact upon the world's way of life, an impact which only now is felt in its full power.

Although oil wells had been drilled in several states by the close of the Civil War, major development was still centered in the sandstone hills of western Pennsylvania. The sprawling wooden derricks and oil-stained wooden tanks had taken the place of the oak trees. Streams ran black with wasted oil, and small boys scooped it from quiet eddies by the barrelful to sell for pocket money. No science guided the driller. He sank his well where oil seeped from the ground, or where conscience dictated. Since con-

science has never been noteworthy for its geological sense, and oil pools are distributed according to geological law, many wells produced only water. Disgruntled operators in search of more lucrative areas, or those with excess cash to expend in exploratory drilling, rapidly moved the tide of oil westward. By 1890 it inundated the Mississippi Valley. A decade later derricks dotted the dry plateaus of Oklahoma, towered above the moist plains along the Gulf, and rose from the warm shores of California.

The rise and decline of a petroleum boom is similar to but much shorter than the life of a mining-camp like Cripple Creek or Virginia City. An oil well is normally at its zenith on the day it first begins to produce, fails rapidly during the first few months, and then produces in much smaller quantities for an undetermined length of time. Some wells producing from the sandstones of Pennsylvania have yielded oil for several decades at a rate of less than a barrel per day. Mexican wells which produced enormous quantities of oil for a short period declined abruptly to nothing. Ten-thousand-barrel producers in Illinois fields have fallen in a single year to five or ten barrels, a production not economically feasible because of pumping and equipment costs. But with the demand for petroleum jumping like the erratic blood pressure of a fat man catching a train, the oil industry skyrocketed yearly to new and dizzy heights.

Because of the ephemeral nature of production, the center of the petroleum cyclone shifted with hurri-

cane velocity from one area to another. Oil Creek, Lima, Spindletop, Salt Creek, and East Texas successively saw the whirl of production pause momentarily in its path. Brawling, lusty towns grew overnight, fringed with the sheet-iron shacks of equipment supply companies, the tent houses of workers, and the piles of used and broken machines which always mark the road to oil. Such a one was Wink, in the late 1920's, which sprang up among the sand hills of western Texas. More than five thousand persons lived, but not comfortably, where only cattle had grazed a few months before. Beds were used in shifts. Drillers, roustabouts, and truck-drivers worked through the blazing heat of days, and celebrated riotously throughout the nights. The town marshal wore two six-guns, prominently displayed, and used them effectively. Men died with blazing guns in their hands as they settled private disputes in the sandy streets. Here was the old West, recreated in the twentieth century by the lure of black liquid gold which flowed from the brown prairies. But the boom moved on, and Wink was forgotten in the promise of new fortunes elsewhere. For every oil man is a gambler, and nothing is more unpredictable than the flukes of oil deep buried in the earth. Each possible new field means a chance for fortune, which may be lost a month later. Salem and Centralia in Illinois were the latest of these centers of fortune: in four short years they too have lost most of their vigor.

Oil is an organic product: it was distilled during long geologic ages by heat and pressure from the buried bodies of ancient animals and plants. The tiny droplets of oil then were squeezed into porous rocks where occasionally they accumulated in quantities large enough to permit commercial production. Where these ancient sediments are present there is a chance of finding oil; where they are absent, oil has had no opportunity to form. Actual pools of oil are rare indeed, since the rigorously controlled geologic conditions which make them possible are seldom ideally realized.

America proved to be enormously rich in petroleum. Twenty-five of the states yielded petroleum, although only a few experienced spectacular boom production. More than a million wells were drilled in eighty years, to yield three-fifths of the world's oil. From its early use as a source of light and industrial power, it invaded every phase of daily life. Its exploitation, accelerated by the development of the gasoline motor, fathered the colossal automobile industry. A destructive bastard offshoot is modern mechanized warfare.

So America, with its abundant metal resources and high standard of living, was transformed into a nation on wheels. Gasoline was cheap and within the reach of every one, averaging only about a third of the price in foreign countries. The automobile companies, offering more and more for less and less, made their products an integral part of American life.

So numerous did they become that those available could carry the entire population of the country at one time. Oil production climbed steadily—accelerated after World War I. New fields were discovered by the hundreds. Technical improvements for well-drilling and oil recovery multiplied. Geological staffs were hired by major oil companies to take as much of the guesswork as possible out of oil discovery. America, and oil with it, was on the boom.

Even as production climbed to dizzy heights and new fields were discovered monthly, some far-seeing men viewed the future with misgivings. How right they were we know now. For here was a nation geared to the daily use of a rapidly vanishing resource, a resource not renewable like soil or lumber but, once gone, vanished forever. And the oil industry, in common with the American tradition of prodigality and lack of controlled exploitation, still clung to many of the wasteful ways of its infancy, methods which resulted in much oil being left permanently in the ground, in overproduction and consequent economic loss, and often in sheer stupid waste.

Some of these wasteful practices were the result of early custom; many came of economic necessity because of small individual capital, others from lack of foresight. Much oil was literally thrown away during early years because drilling equipment was inadequate to handle sudden gushers which spouted immense volumes of oil under the terrific pressure of pent-up gas. At Spindletop, in 1901, gushers out

of control poured forth black rivers of smelly oil for days on end. This picture was repeated a hundred times over. Even more spectacular were numerous oil-well fires that sometimes blazed for weeks, often consuming derrick and equipment and leaving at last only a smoldering crater in the ground. Modern drilling practices and more efficient machinery have essentially eliminated these abuses. Modern "cracking" methods, producing two barrels where only one was refined before, likewise utilize the gas which once blazed in vast torches from every oil-field. Yet as late as 1938 the gas flares of Illinois fields roared twenty feet high and lighted night skies for miles around.

Much less evident, but many times more expensive in the long run, has been the incomplete recovery of oil from the ground. For oil is a thick liquid, held in tiny openings in the porous rocks. To insure maximum drainage of an oil pool, the oil must be withdrawn slowly. Otherwise the larger openings are drained, then fill with water, and the remainder of the oil is trapped permanently underground. Unfortunately, because it is a liquid, oil may move sidewise through the rocks. It is possible, therefore, to drain it from beneath a neighbor's land by drilling a well near his boundary. So boundary lines are usually studded with wells located much too close together, and producing oil far too rapidly. In one recently developed field more than twenty wells were crowded into less than three acres of ground,

when common sense dictated a spacing of not more than one well to each ten or twenty acres. Again, in some instances, oil pools extend under cities, and "town lot" drilling is resorted to by greedy operators. This was true of Oklahoma City only a decade ago. Even with high individual production, these closely spaced wells seldom make money for the driller because the total amount of oil available for each well is insufficient to pay for the high cost of drilling, let alone to realize a profit. Thus rapid production and too close spacing of wells are uneconomic and wasteful. It is estimated that these practices leave one-fourth of the available oil still unrecovered.

Many states, as a result of these practices and with an eye to the future, attempted to control well spacing and the rate of oil production. Proration, a method of restricting production to a carefully calculated percentage of potential yield, was used to give wells longer life and greater total production. It also was intended to prevent overproduction from flush pools which depressed the price of oil far below normal levels. Unfortunately, large fields brought in about 1930 hindered this program: smuggling of "hot" oil was carried on in tremendous quantities, and the price of crude dropped to ridiculously low levels in many areas. Although this meant low gasoline prices for the general public, such overproduction also led to financial ruin for many operators and the literal waste of billions of barrels which should have been left at least temporarily in the ground.

Now that eight decades have elapsed since Colonel Drake first drilled his well, it is estimated that half of our total oil reserves have been withdrawn. We see the urgent need for careful control. A resource so vital to national welfare, during both peace and war, should be held in trust for the future. Federal regulation now determines well spacing, and state laws have tightened. Production is controlled, and technical production practices have been developed to squeeze the last possible drop of oil from the ground. We are aware of our problem and are doing something about it. Whether the present fight for national survival will gut remaining deposits beyond recall is a problem for the future. If we win, the sacrifice will be worth it.

Nor is the oil future entirely dark. Immense deposits of oil shale in the Rocky Mountain states will yield large quantities of fuel when the price rises high enough to make their exploitation feasible. Oil can be distilled from the vast veins of lignitic coal in the Great Plains region. And utilization of waste agricultural products also may yield fuel.

The youthful boom of petroleum is ended. There is no use crying over spilled oil. With sane practices in production and usage, there is still enough for those who expect to use it in building the greater America of to-morrow.

The third foundation corner-stone of our triangular industrial pyramid is coal.

It is the master switch to power. Almost as ever-present in daily life as food itself, source of vital heat and needed light, it also supplies most of industry's necessary energy. The fact that America contains half the world's coal has smoothed the way for a prosperous past and a future which should surpass it. For coal multiplies human energy.

When Father Hennepin, the explorer, drew his map of Illinois, he marked one spot along the Illinois River with the words "charbon de terre." This is its first mention west of the Alleghenies. Since Father Hennepin's time it has been found in more than thirty states, and functions as the industrial main-spring of a broad nation about which he never even dreamed.

A load of coal appears neither interesting nor romantic. The black, dirty, irregular lumps, wrested by earth-soiled workers from the dank maws of mines, end their existence as blacker soot and gray ashes. Its life began in a muddy, scum-strewn swamp. But its story has marched hand in hand with the almost unbelievable history of America.

Three hundred million years ago almost a third of this broad land was covered with tangled swamp-lands: no Dismal Swamp of to-day is gloomier, no Everglades more impenetrable. The strangely shaped trees which poked their primitive roots into the swamp clays were unlike anything which grows to-day. Giant ferns and thirty-foot reeds as thick as a man's arm grew thickly between them. As dead

branches fell into the stained waters, later to be joined by the fallen trunks, they formed a mat of decaying vegetation called peat. In some limited areas, where the water was too deep for the plants to grow, the tiny seeds of the ferns floated and sank to form thick oily masses. There was no winter then, and the dead vegetation piled thick for thousands of years on end.

The earth was not still for long. Periodically the sea waters slid slowly across the swamps, depositing mud over the layers of decomposing plant fragments. This cycle of events was repeated many times. The weight of the sediments compacted the peat and squeezed out the water. The woody fibers became brown, then black, as pressure during long years drove off much of the original material and left the black carbon. So was coal born in ancient swamps, and perfected during geologic ages. The tiny seeds of the ferns formed cannel-coal, so oily it lights with an ordinary match. Elsewhere, mountain folding squeezed the buried seams unmercifully. All apparent trace of the original plants was lost, and the coal became hard, shiny, and difficult to ignite. The first vendor of this coal to eastern factories, about the time of our second war with England, was branded a liar and a scoundrel because men thought he had cheated them with black stones. This was anthracite coal, which occurs only in a small area in northeastern Pennsylvania and is not important on a national scale. Not so the great bulk of the coal

which stretches intermittently from Pennsylvania to Texas; this is the vast reservoir of bituminous or soft coal, layer upon layer of it. A few of the single seams cover five, ten, or even twenty thousand square miles. Many feet of peat must have been compressed to form only a foot of this coal. Yet numerous layers are from six to ten feet thick and extend over hundreds of square miles. Even the fertile imagination of a geologist finds it difficult to envisage the conditions which prevailed while these immense beds were forming.

Under the drab surface of the Great Plains lies another tremendous storehouse of buried energy. But it is only a fifth as old as the seams of Illinois and Pennsylvania. And without the eons of geologic time to age it, this coal lacks the concentration of power desired for efficient use in modern machines. When the better seams become exhausted, these lignites, soft young coals not yet full-grown, may be of great importance. To-day they can be used only near the mine mouth.

Although coal has been known to men for centuries, its primary role in human life has come only within the past ninety years. Perhaps the principal circumstance which stimulated the infant mining industry in America was the building of the first railroad. Railroads meant rapid transportation. This accelerating commerce made increased work for factories, and started the pyramiding industrial structure which we are still building. The lengthening railroads used

more and more iron as their mileage multiplied. Then came the day when coking coal from Pennsylvania was used successfully to make steel from the iron ore of Superior. Because blast furnaces were no longer handicapped by the necessity for using charcoal, the way opened for steel production in amounts undreamed of a decade before. This new coal also yielded immense quantities of gas which could be used to light and heat the cities of the Atlantic shore. The Pittsburgh Seam became world-famous: growing industry rode to glory on its black shoulders. Seven feet thick and extending across portions of three states, it fed the blast furnaces of Pittsburgh, lighted the homes of New York, and energized the factories of a half-hundred cities. Pittsburgh became the steel capital because of it. In ninety years it has yielded more than six billion tons. The reserve remaining should last for two generations into the future.

Not all seams are as useful as the Pittsburgh. By the very nature of their histories, most coals contain impurities. Some of these useless materials remain as ashes, a few melt to form clinkers, and others pour in black smoke from the chimney. Two coals may look exactly alike to the average observer yet act very differently in the fiery furnace bed. The making of steel requires a coal which contains only tiny amounts of sulphur. Coal for gas manufacture must contain a high percentage of gas or its use is unprofitable. Domestic users desire high heat, little

smoke and soot, and few ashes. Because anthracite ideally answers these rigorous requirements, most of it is burned in the crowded cities of New England and the Atlantic Coast. By contrast, citizens of the Middle West, who burn smoky, low-grade coal because it is cheap, spend millions of dollars each year to clean the sooty smears from their dwellings. A recent anti-smoke campaign in St. Louis has almost closed its market to near-by Illinois coals for this reason. The buyer must also consider the amount of ashes. He pays the same price for these as for heat-giving coal, but they give no heat and are expensive to haul away. The same may be said for water in coal, which not only contributes no heat but actually subtracts it. All this boils down to the fact that there are numerous varieties of coal, many of which are fairly satisfactory for ordinary use. Only a few are ideal for certain industrial tasks, tasks for which ordinary varieties of coal are completely useless.

Coal, like petroleum, is a product of slow growth and long time. The circumstance that America is rich in its deposits was a lucky turn of geologic fortune. But the very prodigality with which nature endowed us has been a source of economic embarrassment and misfortune. Because coal could be secured so easily and cheaply, mines multiplied after the Civil War and continued to increase in number until after World War I. This overexpansion was reflected in bitter competition and in consequent low prices, in loss of adequate profits for the investor,

and in absence of a living wage for the miner. The American way of individual liberty for mineral exploitation, so necessary to a rapidly expanding frontier nation, began to present us with critical problems in the decades of maturity. Eventually almost half of our coal was produced at a financial loss, and the industry could supply its market in less than half of a working year. Except for the so-called "captive" mines, owned by large corporations for their own uses, the mines lay idle for the remaining months. So heavy did this economic pressure become that within one recent decade more than five thousand mines were forced to close permanently. Although some had exhausted their reserves of available coal, most of them discontinued operations because they could not make a profit. Their closing added to the numbers of unemployed miners, with resulting economic and sociological problems. It also resulted in the complete loss of large amounts of good coal which would have been recovered had the mines remained in operation. These unmined areas are usually too small to justify the opening of new mines in the future and are irretrievably lost.

The twin straws which finally broke the economic back of the coal camel were the depression of the 1930's and the rise of the strip mine. A strip mine is actually a coal quarry. Seams which lie close to the surface are uncovered by giant electric shovels which remove the overlying rock and earth, sometimes scooping more than thirty cubic yards at a single

bite. Translated into ordinary haulage terms, this means thirty wagon-loads at each scoopful. This waste material covering the coal is piled to one side in a long ridge. A smaller shovel then follows behind and loads the coal into trucks or railroad cars. At the end of the row the shovels reverse their line of march and pile the useless rock in the depression from which the coal has been removed. When they have finished, the land, which looks as if a gigantic plow had furrowed it, is useless for agriculture. The mechanized methods of these strip mines recover a very large percentage of the coal, and the yield per man employed is very high. The pros and cons of the strippers have been discussed acidulously by every one involved, from the farmers who hate to see farmland ruined to the underground miners with whom the strippers compete. It is certain only that their flood of cheap coal had a most unfortunate effect at a time when the financial position of the entire industry was critical indeed.

The problem of coal, however, is not merely the simple one of too many mines. In the past three decades, technical improvements in its use have resulted in an actual proportional decrease in the demand for coal. This has been aggravated by increased use of petroleum in factories, ocean vessels, and homes. Expensive mechanization of many large mines has greatly increased the total capacity as well as the individual miner's output. This has decreased the number of available jobs. Periods of widespread

strikes in unionized mines have in the past allowed non-union mines to gain a foothold which has never been completely shaken. In the words of the National Resources Board, coal has "worked for years in surroundings of poverty."

Under current abnormal conditions, coal is experiencing a vast increase in production. Whether federal regulation will solve its problems in the years after the war is a matter for speculation. But the ugly facts concerning our physical reserves are very clear. Instead of too little and too late, we have produced too much and too soon. Some of the reasons for this have been mentioned. It should be obvious that a company which operates on a narrow margin of profit, or makes no profit at all, can not expend the extra cost required for maximum coal recovery. As a result, American companies have taken out only about two-thirds of the minable coal during their operations, when it would have been possible at small extra cost to recover three-fourths or more. They have steadily utilized the best, most easily mined grades, and left the remainder fast in the ground where it can never be reached. In terms of tonnage, we have wasted in each recent year more than enough coal to supply all of Canada.

Careful federal surveys by competent geologists within the past decade find that we have sufficient coal to last several thousand years. Only a small part of our total reserves has been exhausted. Unfortunately, much of the coal so far used has come from

seams which possess particular properties for steel manufacture and other special tasks, and there is none to replace them when they are completely gone. The larger reserves, for the most part, are of low grade and unsuitable for particular industrial uses. Any highly optimistic outlook for the future neglects also to mention that this forecast envisages the use of thin veins which will be highly expensive to exploit. Furthermore, mining costs pyramid with startling rapidity as the amount of unmined coal decreases.

Even while the infant coal industry was struggling for commercial foothold, land-hungry men toiled slowly along rough trails toward the fertile valleys of Oregon. The lure of unknown places energized their footsteps and smoothed the obstacles over which they plodded. The glossy mountain beaver and the fat, untouched Willamette Valley beckoned only a few in those years. Soon another magnet was to call a multitude to fortune, to drudgery, or to years of searching for never-found bonanzas. This new lode-stone was gold.

In the spring of 1848, James Marshall found gold in the yellow sands of the Sacramento. His discovery proved to be the most important single force stimulating the march of men toward the Pacific. It initiated the unparalleled hejira of the "forty-niners" and altered the course of history by hurrying California into the union. Marshall, like so many finders

of bonanza before and after, was to reap no profit from the bright yellow flakes he gathered in the flume of John Sutter's sawmill. And Sutter finally lost his inland empire on the Sacramento to die in poverty and frustration.

Of all the metals, gold has done most to stimulate men's actions. Its gleam lured Spaniards to conquest in the New World. Men still follow it to far places, their zeal untarnished by misfortune and disappointment. The gold of Sacramento was no exception. It brought the adventurous and the greedy, the hopeful and the covetous from the cities of eastern America where opportunities even then seemed few and profits small. It assisted the dismemberment of the tottering Mexican Empire, hastened the settlement of western America from the farther side. For when the first rush declined and the gold-greedy had gone with it, the land-hungry remained to make an agricultural haven of the rich lands west of the barren deserts. The glistening metal is gone now, but the fruitful land still stands.

This is the history of all precious metals. Gold and her sister silver brought men to the western mountains. After the miners had gone to chase new bonanzas, a few men usually remained to till the soil and establish settled communities. Metals were found in great abundance, exploited feverishly, abandoned overnight. The camps which sprang up around each new lode brought a kind of wild and raw-boned civilization to the untamed mountains and deserts.

Their names mean little to most of us now unless movie-makers have caused their fame to live again on the silver screen. Once teeming with turbulent and strident life, wasting their riches recklessly and thinking nothing of a possible to-morrow, they blazed like meteors across the sky of our national life. Like meteors, too, their fiery flight was short. They are ghosts now, with buildings empty and collapsing, the thump of stamp mills silenced, the miners long since departed. They are ghosts, too, in our recollection, for new times and new generations soon forget the past in the exigent present.

But to a mind enthralled by their lusty spirit and fascinated by the panorama of western conquest, these ghosts still live. Tombstone, Goldfield, Cripple Creek, and a dozen others had lives brief and hectic. But the wildest of them all was Virginia City: Virginia City and the Comstock Lode, which for a few short years became a byword throughout the world for unparalleled richness and riotous living.

The Comstock was discovered in a fateful year, for 1859 marked the birth of the oil industry and the changes in steel manufacture which were to throw wide the doors to the age of iron. The nation stood at the threshold of bitter domestic conflict. Gold-hungry travelers crowded the perilous trails to the Sacramento. Many of them perished in the bitter Utah wastelands between the Wasatch and the Sierras. Others tired of the journey. Wherever they rested, gravel swirled in their miner's pans. Some

of these who were less resolute, by a bizarre turn of eccentric fortune, found the Comstock.

The first ore was carried across the Sierras on muleback and smelted in California. It was incredibly rich, and within twelve hours the rush was on. Before the year was out, thousands of miners with their periphery of gamblers, booze-sellers, and general rascals scooped ore frantically by day and raked in the hard-earned cash by night. The first wild boom collapsed shortly after the Civil War, and was followed a few years later by saner but even more profitable developments. Yet little more than twenty-five years after Comstock filed his first claim, the fabulous story was ended. Almost overnight, it seemed, the stamp mills fell silent and the hoisting engines puffed no more. After yielding more than a third of a billion dollars in gold and silver, causing a world glut in silver, and partially financing the armies of the North, the Comstock was done.

Before the first boom lost its momentum, the political necessities of the Republican party made Nevada the thirty-sixth state. Its population was less than sparse, and it possessed few of the qualities desired for statehood—but votes were needed in high places: the bargain was fulfilled, and the votes were forthcoming. Even now Nevada's population is not much greater than that of Peoria, Illinois. And this includes part-time "citizens" who reside in Reno for purposes of marital dismemberment.

The city that grew in the barren gulches above the

Carson Valley was a skittish jade. Paradoxically enough, the miners named her Virginia. Her flounces and furbelows were the fanciest money could buy. Her financial practices had all the convolutions of a tortured eel. Each man prolonged existence by whisky and a gun: whisky, because the water was unfit to drink, and a gun, because that represented the only means of survival. Maguire's Opera House played to capacity audiences before whom strutted the best dramatic talent of that turbulent decade. In the seats was a full complement of worthless rascals with every imaginable background of chicanery. Among them sat a young reporter who wrote caustic and humorous dramatic criticism: later he was to set the world laughing as Mark Twain. Often in the same audience was John Mackay, whose fortune, based on the ore of the Comstock, was later to found the Postal Telegraph System and lay one of the first successful transoceanic cables.

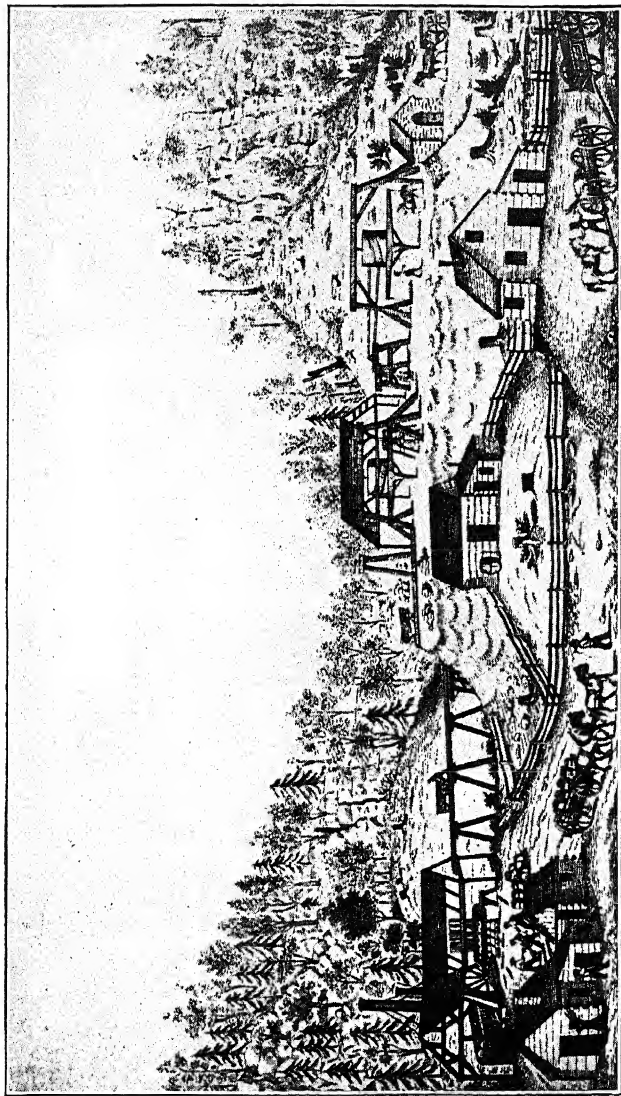
The adventurers who searched for gold and silver scoured the whole mountain region from Pike's Peak to the Sierras. They at least partially subdued a wilderness which up to then no one had wanted. It stretched for more than a thousand miles between the fertile valleys of the Pacific Coast and the farming communities of the plains. One can almost follow the metal-conscious pathways of the miners by the names of the towns they founded. There is another Virginia City in Montana. Both Utah and Colorado have an Ophir. The map is dotted with Silver City,

Gold Creek, Tungsten, Eureka, Silverton, and a half hundred others. Even graduates of our distinguished universities must have followed the golden summons, since there is a Yale in the deserts of southwestern Utah.

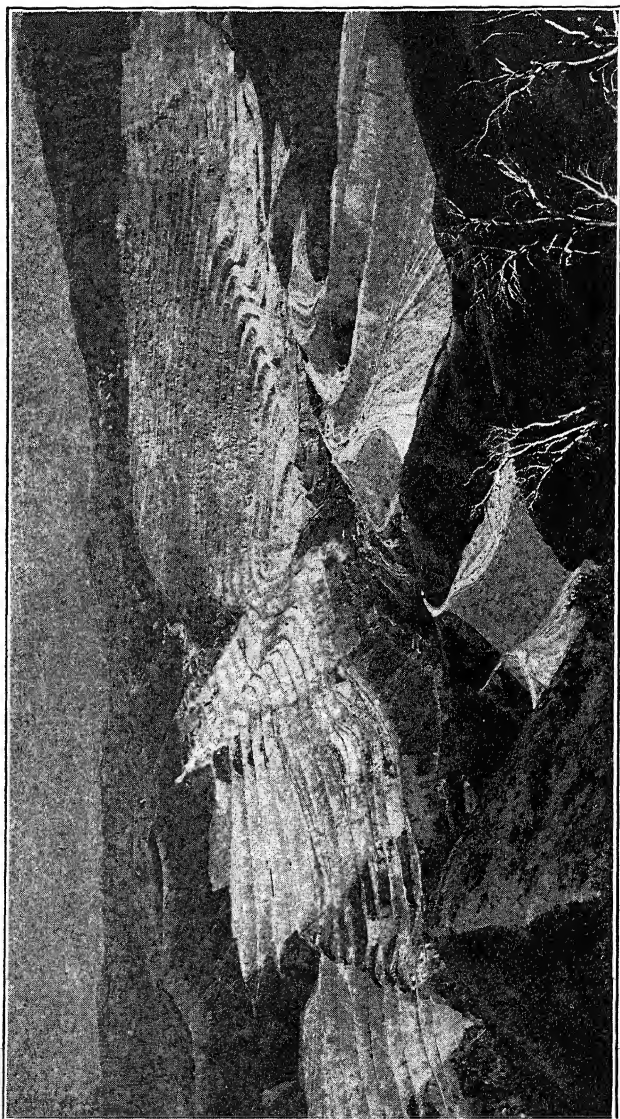
So Virginia City was only one incident in the restless years of western conquest. The gold which nurtured her and brought men to the raw mountains of the west was hardly missed when recently taken from circulation. So far has the former king descended! In a recent year all the gold produced was little more valuable than the cement sold during the same period. And silver, despite a price of thrice its intrinsic worth maintained by political exigency, was less than half as costly as the sand and gravel. Now gold mines are closed completely, that miners may work the baser metals so much more useful in our struggle for survival.

Yet another metal was to rise to glory after gold and silver. As electric power multiplied, copper joined strands with iron in the electric motor, in the miles of current-bearing wire, and in the multitude of machines which made life easier for John Doe.

Pure copper from the old volcanic hills of the Keweenaw Peninsula, which projects like a thumb into Lake Superior, had long been known to the Indians, who hammered the nuggets into ornaments. Although the first attempt to mine it was made about the time of our first war with England, lack of a market and of transportation prevented exploita-



Early copper mine, Lake Superior District, 1850.



Mining a mountain of copper at Bingham, Utah.

tion. It remained for Douglas Houghton, geologist and politician, to initiate the first real mining. Thereafter for more than thirty years the mines supplied the demands of the growing nation. As the mines deepened and profits declined, the miners moved to new diggings and the shaft-houses were silenced one by one. Butte, in Montana, took the limelight to produce more copper than any other district in the world. Then Butte in its turn abdicated. Shortly after the Spanish-American war, a new star rose slowly into the copper sky from the barren mountains of Utah. This was Bingham, which still stands unsurpassed.

Bingham is a mountain shot through and peppered with copper. Houses in the town, which huddles along a single tortuous street at the mountain base, are roofed with copper. The creek waters which roar down the same gulch yield thousands of pounds each year. Wherever miners now gather, Bingham and copper are spoken of together.

The opening of this vast deposit marked a new era in mineral exploitation. Previously it had been the custom to require rich underground lodes for extensive mining development. Bingham ore averaged only one per cent copper, and a few years earlier it would have been worthless. It was made profitable by operations on an unprecedented scale. Giant steps were cut in the steep face of the rocky copper mountain. Each step held a railroad track and several large steam shovels. Now there are thirty of

those terraces extending upward tier on tier for a thousand feet above the floor of a gigantic pit. The great shovels load long trains with the ore and they slide downhill to a smelter on the shores of the Great Salt Lake. So efficient are these methods that the cost of mining is only a few cents per ton. The enormous reserves will last for many years.

The rise of Bingham is symbolic of the new day in American mining. Riotous and wasteful years have been replaced by high efficiency, careful conservation, and long-range planning. The frosting on our metals cake has long since been gobbled. We must make the cake last as long as we can. Perhaps the greatest single invention to augment its existence is the flotation process. Without it, the low-grade ore of Bingham and other immense deposits scattered around the earth would be worthless. Flotation consists essentially of separating the different minerals in a finely ground ore by floating the tiny crushed grains apart. The ore is crushed to about the consistency of fine sugar and placed in a tank filled with chemicals. Air is blown through this mixture from the bottom while it is stirred vigorously. This causes bubbles to rise through the liquid and carry particles of mineral to the surface. By varying the chemicals, a different mineral is separated at each stage in the process. Since many ores contain four or five different substances each of which is valuable if separated from the others, flotation makes possible the exploitation of deposits which previously were

either worthless or highly expensive to utilize. So efficient is flotation that mineral concentrations resulting from its use average more than ninety-five per cent in purity. As a result, much ore which was thrown away in the early days of mining has now been reclaimed. The old waste dumps of many mines have yielded a rich harvest, and present operations have reached new maxima in recovery.

Men have prated for two generations about the inexhaustible resources of America. This is sheer nonsense. Their estimates are no more accurate than the prophecies of politicians who estimated that it would take two thousand years to settle the United States, when actually the process was complete in a century. It is true that our resources still are very large. But even their immense scope can not long survive the rate of exploitation which we have practised during recent decades. Prior to 1900 our demands were fairly reasonable. Since then each decade has seen production pyramid as industry swelled to its present mammoth proportions, with each new ten-year period using as much as the four which had gone before. The armament program of World War II places the heaviest burden of all on the depleted deposits. Thousands of geologists now scour every possible mineral-bearing region for new sources. The days of war shout the unpalatable truth which decades of peace had only whispered. We can not go on in this way indefinitely! America is not entirely self-sufficient! We must not continue the

wasteful and unthinking ways of peace! Tin, manganese, aluminum, and tungsten are only a few of the sinews which we lack to fight a modern total war to a successful conclusion. On the bright side, though, we are better equipped than our former practices deserve. Our land is so young that even our grandiose gestures have not had time to exhaust its riches. Copper and lead, zinc and iron, coal and oil still lie in great abundance waiting for the miner's pick or the driller's bit. But we must face the bitter truth that long survival calls for a budget of the future. We can no longer support the methods of a frontier nation. If nothing else be clear, it is too evident that our physical frontier has vanished. No really major deposits of minerals have been discovered for three decades. Ceaseless exploration by crews of trained geologists has clearly outlined the areas of coal and petroleum; no new major oil-fields have been discovered for five years. We face the necessity for sacrifice of the license which frontier men called liberty. Certainly we must plan with unremitting care. For on our stratagems and their successful outcome depends the useful life of these resources. The new generations who will carry out dreams of a better and greater America will need them for their vital tasks.

The mineral frontier has disappeared in smelter smoke. The physical frontier of free or cheap land has likewise vanished. No longer can men pull up stakes when fortune fails them, to seek new life and

fresh hope free from the competition of other men. True it is that compared with the long occupied regions of the world, our population is scant. Nevertheless, these changes necessitate a shift in our method of living: although opportunity still beckons, it is now clothed in new apparel. A different kind of world is in the making, and our success or failure in it will depend in large part upon our powers of adaptation.

These changes were becoming apparent in the early years of the present century but were largely camouflaged by the abnormal years of the first World War and the period of hysterical expansion which followed. The economic depression just ended emphasized them with startling abruptness. The current war merely postpones a decision and allows us a short breathing-space to formulate designs for years to come. America is growing up!

This growing-up process began along the eastern seaboard with the rise of industrial expansion and the cessation of migration from northern Europe. The Germans and Scandinavians for the most part passed on through, en route to the farmlands of the prairies. But cheap labor was needed for mills and factories. The crowded cities of southern and eastern Europe offered a plentiful supply. They would work long hours for small wages and were at home in crowded quarters. So this flood of impoverished humanity settled in the cities and mill towns to be exploited in

much the same degree as the mineral deposits before them. As their numbers multiplied, America began to assume an urban complexion.

This began the big city era. During the seventy years just ended, even the long-established centers of eastern states have multiplied their populations five times. In the far west the effect has been more startling because no really large human movement had occurred there before 1870. Denver increased sixty-five times during this period, Los Angeles multiplied by thirty, and in Seattle, three hundred and fifty people now live where only one existed before. Chicago rebuilt to a size a dozen times larger than before the great fire, while the automobile factories were expanding Detroit by twenty. Upstart Dallas and Oklahoma City, now boasting a half-million persons between them, had not even been settled at the beginning of those seven decades.

This cityward migration was not caused entirely by the new European immigrants with different racial and social backgrounds. The frontier which lay formerly in the broad prairies had now moved to the crowded urban centers. New factories paid unparalleled wages, and Cyrus McCormick's machines caused a labor surplus on the nation's farms. Then the farm boys moved to the city, and the village boys soon followed. It is a trenchant commentary indeed on the vast changes in American living within a few short decades that in 1940 a live cow had to be led

from one city school-house to another, so that children might see one for the first time.

The so-called "urban trend" became particularly marked during and after the first World War. High wages, comfortable living, and abundant amusement drew people to become cliff dwellers along the noisy city streets. The wartime demand for labor also initiated Negro migration from the agricultural deep south to the industrialized northern cities. New York, Detroit and Chicago were particularly affected, and the resultant problems of adjustment are still critical. Meanwhile, the first colored man since the Reconstruction Era was elected to Congress—from the Negro districts of Chicago.

The fantastic bubble of credit-inflated prosperity broke in 1929 and was followed by the great depression. Even though the farmers had little money, they could still eat. But many starved in the soulless roar of the cities. They starved while grain burned in farmers' fields and suckling pigs were slaughtered to raise the price of their elder brothers. Once more America faced the problem of too much and too soon, and could contrive no real solution.

The Book of Lamentations opens with a text fit for unnumbered tragedies in American history. "How doth the city sit solitary, that was full of people! how is she become as a widow! she that was great among the nations, and princess among the provinces!" For the tale is not yet told when we have

chronicled wasted and wasting natural resources. There still remains the pathetically purposeless sacrifice of men and women—the damaged lives and damned souls. Virginia City is the ghost not of silver and gold but of a community that lived so horribly as hardly to be regretted in its desert tomb. And the land is spotted with such specter towns: forest villages lost in cut-over and burnt-over wilderness; coal towns dead and dull as their shale pile markers; oil settlements declining with the last oozing of their black blood; the Joads who cursed the climate and died. Here are the sharecroppers on Tobacco Road, finally good but for vulgar laughter.

Is “courageous” the proper adjective for the American frontier, or is it “long-suffering”? For every person who died dramatically behind a stockade fighting the Indians, there were scores who were broken by the brutal demands of border life. One would not deny that American history has been dynamic, but it was also capricious, accidental, and reckless. It was as careless of human beings as it was of material resources. It avails nothing now to wish that our development might not have been so unplanned, but one can not help regretting that so many visions were dead-end streets. The third-party movements of the decades after 1870 give us a political expression of human disillusionment and frustration, of misguided hopes and misplaced labor. They tallied grievances, not glories, and produced no men of destiny. The recognized geniuses of that era were

mostly men whose social philosophy was a curt demand to be left alone while they stripped the forests, raped the mines, and mortgaged the farms.

These human costs can not be calculated, but they may be imagined in religious and cultural terms. Though our spiritual heritage was rich and varied, it often ended in a prodigality of primitive religious sects. We became rich enough to spend all our youth in school, but we may still be retarded in our learning. Whether we are too late in the conservation of humanity, as we are tardy in the preservation of our natural resources, some future generation will judge.

CHAPTER SEVEN

“Hard Times Comes A-Knocking”

IT was May 11, 1934. The usual blue of the New England sky changed to a dirty yellowish-tan. Bostonians speculated idly about forest fires in the Adirondacks, until the evening newspapers told the real story. Dust had obscured Boston's sky that day, and all the skies from Oklahoma to Cape Cod, before it swept forever into the Atlantic. It was fine pulverized soil, millions of tons of it, carried by the unceasing winds which begin life fiercely over the Great Plains. Life-giving fertile soil, lost by human carelessness and the unpredictable dry years which ever plague the climate of semi-arid regions. This was the drouth which sired the “Dust Bowl” and brought desolation to a region as large as many kingdoms. And it first dramatized to the normally thoughtless American citizen the whole process of unprecedented soil destruction in his land. In common with our tradition of performing all things on an unparalleled scale, we had devitalized our virgin soils at a rate never equaled by any other people. Only a century after much of it had first been furrowed, and less than three decades since wheat first

sprouted on many of its acres, this fundamental national possession was facing disastrous exhaustion.

Geologists estimate that the surface of North America is normally worn down about one foot in ten thousand years. When soil and earth are covered with grass and trees, complicated natural processes produce it about as rapidly as it is removed. The stems and roots of the grass and the dead leaf mat on the forest floor soak up rain like a dry sponge. Even when they are saturated, water flows from them slowly, and only on the steepest slopes can it move rapidly. Under these conditions, it still trickles quietly into the streams long after rain has ceased to fall. The volume of the rivers remains fairly constant, and little mud darkens their waters except during the floods of spring.

Contrast with this the shaven countenance of a land ready for the farmer's planting. The grass has long been destroyed, and the trees have fallen. Plow and disk and harrow have cut and bruised and furrowed the porous soil. It lies naked and defenseless, easy prey to the whip of gusty winds or the battering of thick-falling water. These two are the arch-enemies of the land. The fluid energy of water in humid climates and the more delicate but even more restless force of moving air in regions of sparse rainfall attack the earth unceasingly. When they deplete the soil, which alone makes life possible upon the lands, they undermine constantly the very foundation of human existence.

A century ago when the distinguished British geologist, Sir Charles Lyell, first visited America, he commented on the soil erosion already apparent in the southeastern states. Ninety years later the grim realization of irreparable soil damage forecast a bleak agricultural future for much of the land. Only then was a comprehensive program initiated to combat it. The results of careful nation-wide surveys made within the past decade have shocked many Americans. We need to be shocked! The ugly facts ought to create consternation. Three billion tons of our soil are washed from fields each year. Mixed with sand and silt by swift-flowing water, its fertility is destroyed forever even though it does not reach the sea. Almost one-fifth of our agricultural land should no longer be cultivated because it will not supply a living. Only two-fifths of our cropland yields most of our food; the balance has lost so much fertility that it merely permits a slim livelihood, in many districts only a meager existence, to the tiller. An area as large as all of New England plus Delaware and New Jersey has been completely ruined for farming. Another acreage the size of Kansas has been so severely damaged as to warrant its withdrawal from use. And an additional region almost as large as California has lost so much topsoil that its yield is seriously reduced. These three include one-half of our best soil.

Some areas have suffered more than others because of longer occupation or differences in soil, land

slopes, and climate. In many of the southeastern states where, because the soil never freezes, erosion is a year-round process, three-fourths of certain localities have been abandoned. In the southern states west of the Appalachians, one-fourth of the land has lost most of its original soil cover; an additional half of the area needs an immediate anti-erosion program. Even in the plains area, settled only fifty years ago, much of the soil has been removed from wide areas.

The problem of how this process of erosion operates and why it occurs has been attacked by practical means. The figures cited are not the estimates of arm-chair experts but the results of actual field mapping by trained soil scientists. Measurement of soil behavior has been approached in the same factual fashion. Plots of land in selected regions have been set aside for continuous observation over a period of years. These have included all kinds of soil in all types of climate, with all variations in slope. Ingeniously devised equipment traps every pound of soil and every gallon of water which escapes from these experimental fields, so that guesswork and estimates are entirely eliminated.

These demonstrations show definitely that grass or forest or crops which cover the ground thickly retain soil and water with great efficiency. But corn and cotton, planted far apart and cultivated with great frequency, sap the life from the land in only a few years. Removal of topsoil from corn-fields occurs on an average about three hundred times as fast as

under natural conditions. Even with the usual rotation, whereby the sparsely planted crops alternate with those set close together, soil is lost much too rapidly to assure a safe future. One can only conclude that the farming practices used in America for three centuries and still practised to-day are unfit for most of our land.

The skeptic will point to our bumper crops of corn and wheat to disprove these conclusions, but he reasons without remembering the effect of mechanized farming, of improved plants like hybrid corn, of greater use of fertilizer and more efficient control of such pests as the boll weevil. All these improvements should increase average yields; actually, they have not. Observations in widely scattered localities indicate rather a definite and continuous reduction.

There are precise reasons why continuous use of soil steadily reduces its fertility. Soil scientists would explain with statistics showing the chemical and physical qualities of those fruitful seven inches of black porous topsoil. Let us instead consider them as a savings account, built up slowly through thousands of years by nature's processes. Rather than dollars, it contains the materials which feed a crop, particularly potassium, calcium, phosphorus, and nitrogen. These are concentrated largely in the upper portion, which is so porous that it allows easy penetration by rain water. Plants withdraw constantly from these savings, some one material, some another. In the end the soil's bank-book will show a constantly decreas-

ing account unless deposits are made regularly to offset the withdrawals. This is true even if no erosion occurs. But erosion adds an additional drain by robbing the surface material in which the plant food is concentrated. The only way in which the account may be balanced year after year is to deposit fertilizer regularly in large amounts. But fertilizer is expensive! The more the savings are depleted the greater the yearly deposit needed, but the smaller the interest. And so begins a discouraging cycle which ends in financial ruin.

If a person handled his financial inheritance in this fashion, we would call him a bad businessman. Yet many of our farmers have done business in this way for decades. Most of them are victims of a system; once caught in it they can not escape. Their misfortune is not theirs alone: an ailing agriculture eventually infects the whole nation.

So the American farmer now runs panting on a whirling treadmill. Ahead is soil ruin, behind follows financial insolvency. The villain who placed him there has, Cerberus-like, many heads. We call them tradition, science, economics, politics, and society. Tradition because they involve outmoded farming methods practiced for three centuries. Science, because proper use of soils of varying composition and physical character may be planned satisfactorily only by technical analysis. Economics, because capital is lacking to maintain soil in good condition and to correct the ravages of neglect and misuse. Politics, be-

cause the elected representatives of the nation have failed to establish a practical working policy for land use. Society, because almost half our farmers are tenants, and in many large regions they must see their children grow up without an educational background adequate to cope with the complex problems of modern rural society.

The average farmer is in many ways the last of our pioneers. Unfortunately, some of his frontier traits have contributed to his troubles. Individualism was necessary on the frontier when each man had to make his own decisions. But the modern world depends on coöperation and compromise. The city resident, crowded within narrow geographic limits and usually working for a wage, has learned to bow to the judgments of others. But the farmer, working alone and still accustomed to making his own rules, is still an individualist and has found coöperation difficult.

The practical experiments of the Soil Conservation Service have gradually convinced him of the utility of their suggestions. Despite the success of their demonstrations, these soil scientists make no claim to have found all the answers to soil problems. Even if all solutions were known, it would be impossible to put them into immediate practice. For the farmer, under stress of modern conditions, has become a soil miner, raising crops for their cash return. This change came with increased use of modern machines, particularly the tractor. It has enlarged the amount

of land a man can farm, but his expenses are greater because machinery is more costly than horses. About the time of this extensive rural mechanization, the price of land rose to dizzy heights because of World War I. Taxes and mortgages followed. When the price of land and its products slumped to abysmal depths after the war, the mortgages were still unpaid, and the taxes remained. Foreign markets were lost when European farming was resumed, and the situation was aggravated by the rise of nationalistic policies and severe competition from Argentina, Australia, and other temperate regions. So the farmer was pinched by debt and low prices and plagued by high interest and lack of unity of action. This resulted in the formation of the so-called "farm bloc" in Congress, which has had some success in alleviating a few of agriculture's ills, and by vociferous debate has kept the farmers' plight constantly in the minds of the public. Despite the persistent activity of these congressmen, their efforts have only temporary results. No pressure group working by political means alone will ever solve the farmers' problems.

Some of these economic ills were inherent in our national policy of land development. Grants of land were made by the federal government as long as good land was available. In the Great Plains much was given to transcontinental railroads to meet the expense of construction through unsettled country; large corporations also acquired immense tracts; both sold to the settlers on credit. Even if the immigrant

were fortunate enough to secure a homestead, he could file claim on only one hundred and sixty acres, for the Homestead Law had been written by politicians from the humid east where a quarter-section would support a family. Most of the homesteads, however, were located in the semi-arid west where twice to fifteen times that amount of land was necessary for a decent living. Not until almost all the land was gone and much of it in the hands of large land-holders, did the legislators realize their mistake. Then it was too late.

By 1880 a quarter of our farmers were tenants; sixty years later almost one-half of our farmers tilled land not their own. Unfortunately, absentee owners usually want immediate profits in the form of cash, and the tenant must produce them or move off. He has no stake to protect, no real roots sunk deep in the land. If it becomes depleted, he can move on to another farm. And thousands do just that.

This complex of evils has remedies, but they are tangled so inextricably that no one can be applied alone. Like castor oil, they are unpleasant. They involve first of all a wrenching alteration in our thinking about land, drastic changes in our methods of tillage, and the end of the individualistic era in agriculture. Money must be spent in large quantities in many areas to prevent the spread of soil-destructive processes. Much of it must come from the city taxpayer, whose stake in the land is much larger than he knows. But the results of a

carefully coördinated program freed from political meddling and sectional bickering will pay vast dividends in the years to come. The alternative is further land destruction and continued impoverishment of agriculture. It requires no deep knowledge of economics to realize the national implications of such a future.

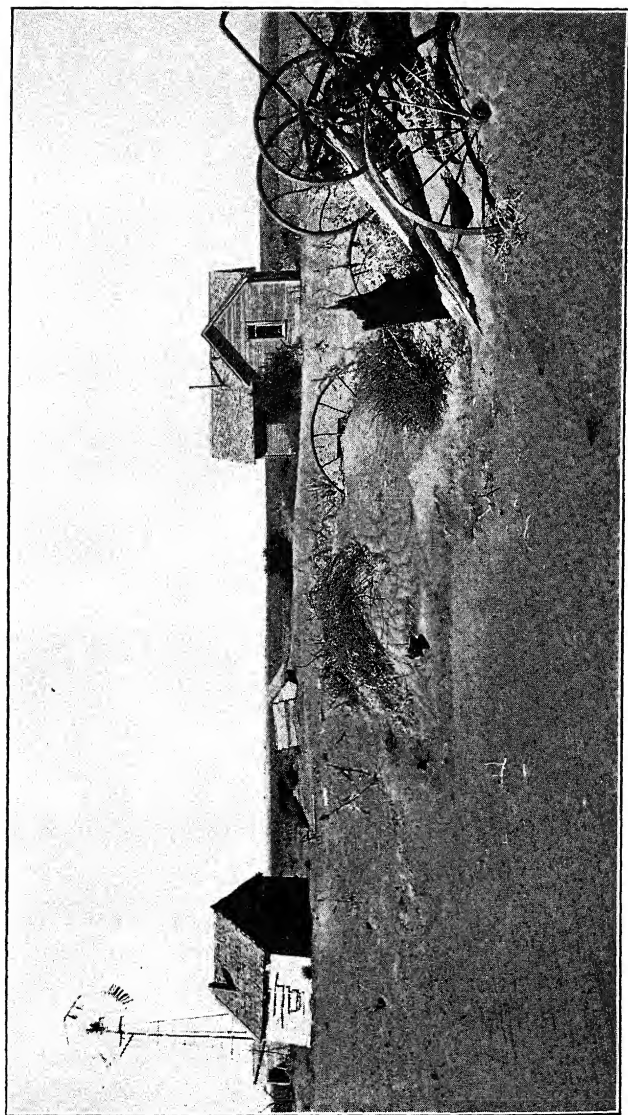
Federal agencies have approached the remedy primarily in two ways. They have issued a barrage of well-written factual articles. These are aimed at the voting citizen, to acquaint him with the situation and the means being used to combat it. Experiment stations and numerous coöperative projects in affected regions have been operated to prove to the farmers by actual practice and observation the values of new soil-saving methods in tillage and farm management. During its life-time the Civilian Conservation Corps supplied labor on these projects. Almost all the demonstrations have been successful. The way to coöperative attack is open, but the farmers are too poor to pay the bill. Few Americans, preoccupied with a fight for survival, realize the need for unceasing vigilance now. Each year which passes without vigorous action makes the ultimate conservation of the land vastly more doubtful and expensive.

Although other measures to alleviate the ills of agriculture have been devised and practiced, the fundamental one is maintenance of fertility together with an equitable return for crops. Social and economic experiments merely postpone the rueful day of reck-

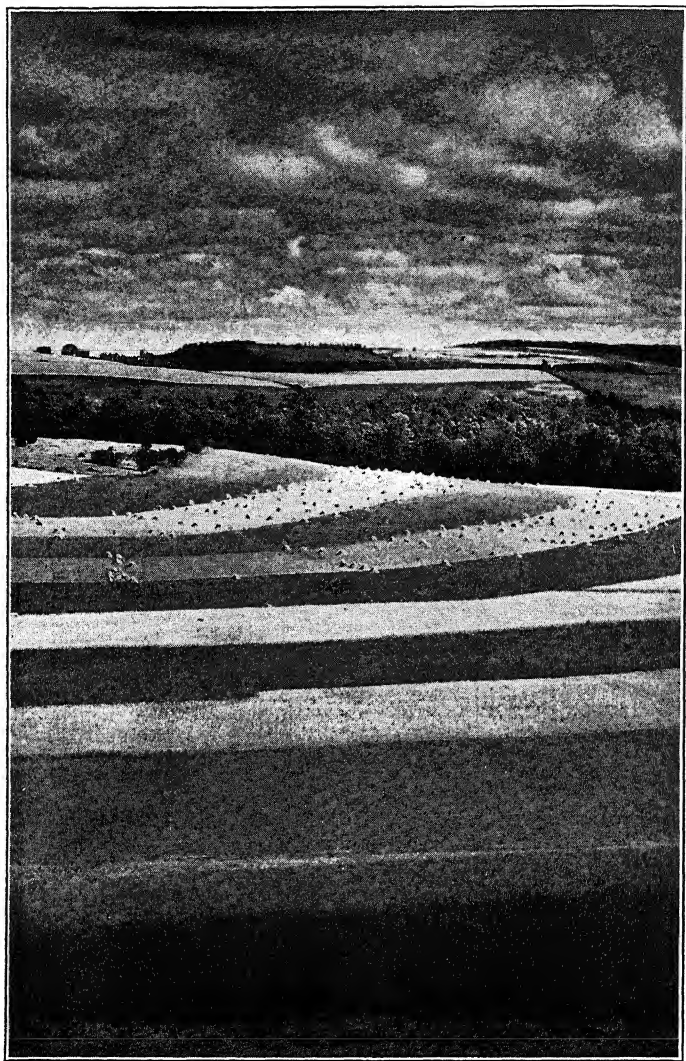
oning. The first step is to save the soil. This would mark the first definite stage in agricultural resuscitation, and from it would stem the solution to other problems commonly thought not to be associated with farming. These include the efficient use of streams for navigation and electric power, the use of water for irrigation, and the availability of underground water for wells.

Careful measurements show that several hundred times as much water runs off a clean-tilled field as from thick grass or natural forest cover. This immense acceleration of run-off from stripped land is the key to all soil erosion and its attendant difficulties, for running water has tremendous energy which multiplies many-fold with every increase in volume or rapidity of flow. With nothing to slow its movement, water picks up man-loosened soil and carries it away to disuse and destruction. A single heavy and persistent rain may wash away thirty tons of topsoil per acre. If we use the round figure of one cubic yard of soil for each ton, this means that more than two inches of topsoil were removed from that acre during a few days of heavy rain. The average fertile topsoil has a thickness of about seven inches, and when it has been removed the power of the land to produce crops may be reduced from one-half to three-fourths. A little simple arithmetic indicates the financial future of the man who farms this land!

What happens to the washed-off soil? It clogs the channels of streams and spreads across the flat floors



“Desolation to a region as large as many kingdoms.”



Beautiful, useful, and preserved for posterity.

of the valleys. Geologists call these surfaces flood-plains. On many of them the deposits made during the white man's tenure already equal those laid during thousands of years by natural deposition. The new deposit is mixed with sand and silt, lacks fertility, and is quite unlike the rich black soil of the original river-bottom land. The mud-choked channel of the stream becomes shallower and fills more readily with flood water, which flows in larger quantities from the shorn land. Men build their dikes higher to meet these new floods, but the river rises to meet them, again and again. When this grim game eventually reaches a limit the river always wins.

Meanwhile the hydro-electric power plant on this stream loses its potential energy as the reservoir which stores the water fills with silt and mud. As reservoir capacity decreases, there is insufficient water to turn the turbines during dry weather. Therefore, the factory machines slow down, and workers migrate to search for new jobs or sit disconsolately at home and wait for government relief. The city stockholder whose money built the dam and power-plant then receives fewer dividends. He complains of hard times and makes fewer purchases from his merchant neighbors. In this way, a tiny unheeded rivulet of water, multiplied a million-fold by our carelessness or ignorance of nature's process, involves us all in a vicious cycle of self-destruction.

It is readily apparent then that both the preservation of our soil and the full use of our streams de-

pend on properly controlled land use. More specifically, they hinge on methods so graduated as to control rapid run-off of rainfall. So the saga of soil moves hand in hand with the story of water, and each is useless without the other.

Ever since human beings began to form permanent settlements, water has been one of their first concerns. Water to drink, and water for crops, later water to perform a multitude of industrial tasks, and finally water for recreation. The arid inter-mountain basins of southern Asia are littered with the whitened bones of cities which disappeared because water failed. And the striking contrast between the comfortable prosperous communities of humid climates and the precarious existence of men where water is scarce or uncertain merely emphasizes its importance in every phase of human life.

The farmer of Illinois takes water pretty much for granted. That is, he did so until less than ten years ago when the unpredictable extremes of a continental climate reduced rainfall by one-third. Within a few months wells were going dry, streams were reduced to stagnant pools, and even the mighty Mississippi slackened. The deep wells which supplied many towns showed signs of failing. The agricultural economy of the Middle West, accustomed to abundant rainfall, suddenly found itself battling the conditions which are normal several hundred miles to the west. The farmers were unprepared. Had it not been for

the drought-resistant qualities of recently introduced hybrid corn, the dry years might have ended in agricultural catastrophe. Fortunately, the drought ended the next year. However, as in all things, the cycle of natural events will some day cause it to return.

Rainfall in the United States is extremely variable, variable from place to place, from year to year, from season to season. Throughout the eastern half of the nation the Gulf of Mexico and the Atlantic Ocean furnish an adequate and relatively uniform supply. But west of the 100th meridian, which bisects the tier of states from North Dakota to Texas, deficiency of moisture always threatens. The marginal amount is twenty inches each year. In that broad area which stretches for fifteen hundred miles from the plains of Kansas to the green ranges bordering the Pacific, the average rainfall is well below that critical figure.

The yearly variation of rain west of the Mississippi averages about twenty per cent. Unfortunately, averages mean little. More often than not, periodic droughts reduce moisture by one-half. When a variation of only three or four inches in a single year may represent the difference between a good crop and no crop at all, the precarious character of the agriculture in this region may be appreciated.

During the late thirties the farmers of the Great Plains were moving out in great numbers because a series of dry years had exhausted even their iron endurance. On the other hand, in 1942, the wheat growers of western Nebraska rejoiced in bumper

crops and green fields. What the next year will bring is unpredictable. Even if yearly rains are sufficient, they mean little if they fall at the wrong time; spring and summer are the vital seasons. During a rainless spring, the seed remains unsprouted in the ground, and the dry dust blows from the plowed fields in great dark clouds.

Horses which escaped from Spanish explorers had early found this a grazing paradise of short grass, generally lush in the spring and cured as rooted hay during the dry hot summers. This had been the habitat in which the ancestors of the horse originally evolved from dog-size and five toes. He stayed until the cold of the glacial age drove him out. The historic return of the horse from the Old World transformed the life of the Indians, who with remarkable skill adopted this device of the white man, often a century before the white man himself was seen. Hitherto, human life on the semi-arid plains, unsuited to tillage, had been sparse, though for considerable numbers of Indians along the edges, the millions of bison had become important for food, clothes, shelter, tools, and art and religion. Now the buffalo became almost all of life, for, equipped to hunt him as never before, the tribes moved on to the plains to live. From all sides they came in, a mixture of peoples with a babel of tongues that of necessity devised a remarkable sign language to ease their communications. These were the last of the aborigines to offer successful resistance to the encroach-

ment of the white men within the area of the United States, and they were reduced to submission not so much by military punishment as by the systematic extermination of the bison. This tragedy of nature occurred during the third quarter of the nineteenth century, when wholesale butchers, collectors of hides and pelts, sellers of bone fertilizer, and railroad riding "sportsmen" wiped them out.

By their depredation, the Great Plains were cleared for still another mammalian migration. Along with the wild horse spreading northward from Mexico came the wild cattle which within a few generations of their introduction from Spain were running free by the thousands. They were formed by the new environment into long-legged, bony, long-horned creatures, capable of long travel on little water or food—ideally adapted to the grazing conditions of the Plains country. By the nineteenth century the Texas area was so well stocked with these animals that the beginning of the cattle industry was largely a matter of gathering several hundred of the wild stock into a ranch. So numerous were they that during the seventies and eighties it was possible to start the great cattle ranges of Montana, Wyoming, and the Dakotas by driving great herds north to the new grazing grounds.

The technics of this cattle business were developed on the ranches of the Spanish that spread north along the two Mexican seaboard. The first cowhands for the herds were the Indian captives which the con-

temporaries of Cortes used as slaves, and which were branded with a G for *guerre*, that is, "war." Before Jamestown and Plymouth were settled, descendants of these Indians were already becoming skilled *vaqueros* or cowboys, learning and transmitting the tricks of their craft, and living their whole lives on horses. How much the Spanish-Mexican influence affected the cattle business that crossed north beyond the Rio Grande is revealed in the vernacular of range life: the cattle pen (corral); the kind of horses used (broncho); the particular batch of horses gathered for the day's work (remuda); the word for one's fellow (hombre); and the term for bad judgment (loco)—these are almost pure Spanish. Adopted from the same source, though changed somewhat more in use, were lariat, pinto, rodeo, and the ranch itself.

But the vast ranches which sprang from the brown plains when the railroads first furnished transportation for their herds were soon to suffer from the very elements which had contrived their birth. For the railroads and the land companies finally found the cattle business insufficient for their needs. Drought, that ever-threatening menace of the plains country, bitter winter blizzards, and overgrazing which materially reduced the grass, all played their part. The crowning blow was the influx of the settlers who brought with them the plow and the barb-wire to settle the doom of the great cattle kingdoms.

These settlers were occupying the last considerable

area of good land left vacant in the United States. Cheap rich land and favorable climate caused the more humid eastern prairies to be taken earlier. The metallic lodes of the mountains drew men to establish scattered mining-camps far to the west. But at first the dry plains and the arid basins between the mountains were merely obstacles to be crossed as rapidly as possible. It was not until the last decades of the nineteenth century that they attracted people in large numbers. Fortunately, or unfortunately, depending on whether one was a seller of land or a buyer, the early years of this movement were marked by adequate rain. They were followed by dry years, and ever since the gage has changed from adequate moisture to crop-searing drought.

A reclamation program was first suggested during the early years of settlement, but more than twenty years of debate were to elapse before the Bureau of Reclamation was finally established in 1902. Although designed at first to serve the entire nation, reclamation has gradually come to be associated almost entirely with the construction of irrigation projects in the arid west. Forty years afterward it may be well to review its accomplishments.

Western reclamation grew out of an ideal, a strictly American ideal that each man should have a farm. By 1890 almost all the desirable western land had been settled. In the arid and semi-arid regions were many districts where land was adequate and water

available, but only between the stream banks. Why not, it was asked, divert this water to make the desert bloom and establish homes for men? Why not assist the tenuous transcontinental railroads, their assets bulging with grassland granted by a generous government? Why not, since the humid lands were gone, dispose of some of the vast area of dry federal land? So congressional committees were appointed to study the problem. Newspapers pictured the irrigated future of the west in roseate hues; railroads published beautifully illustrated pamphlets. And President Theodore Roosevelt beamed through his shiny glasses, for conservation and the west were close to his heart. In fact, had it not been for the foresight, personal force, and enthusiasm of that administrative Rough Rider, conservation and reclamation might have waited for years in the doldrums of congressional bickering and political indecision.

Now, after forty years, we can truly say that federal reclamation has been a financial failure. It was doomed from the beginning. But in its contribution to our national spirit, in providing homes for free men and establishing a bridge of communities between the thickly settled east and the rising west, it has had indubitable success. Who can estimate those values? There is no market price for such intangibles!

The major difficulties of reclamation are easily indicated. Almost all projects have cost much more than originally estimated. The settlers who came to take up land were often poorly prepared, both in

money and in experience. Most of the easily irrigated land had already been appropriated by private or community organizations. The repayment plan of the federal government suffered the same fate as the sale of eastern land more than a century earlier: long-term, interest-free credit proved a failure.

On the credit side, reclamation established stable modern communities in the semi-arid prairies. Their cash crops—sugar beets, potatoes, and fruit—have no competition with the major produce of the humid east. Their hay furnishes winter feed for cattle which graze in summer on the semi-arid pastures. During the great drought of the thirties, irrigated areas suffered a shortage of water, but even under this handicap, they saved many of the cattle and sheep from the parched surrounding lands. Most important of all, they acted as anchor posts for the fabric of settlement which otherwise might have worn thin under the strain of years of disappointment.

Reclamation's most dramatic impact upon our way of life has been written in the southwest. There the dry, uniformly warm climate is ideal for fruit and vegetables. Moisture is scarce all along the Great Valley which stretches from the Klamath Mountains to beyond the Mexican Border. But water flows abundantly down the western slopes of the Sierras and can be carried easily to cultivated fields and orchards. Here, then, was a vast reservoir of fruit and fresh green vegetables which flourished while the densely settled East lay in the icy grip of winter.

Of course, the public appetite must be educated, and the railroads must find it worth-while to haul loads at top speed to reach distant markets before the perishable produce spoiled. Therefore, the growers organized for action and reformed the habits of national taste. Ear-arresting trade names and eye-catching pictures faced helpless citizens from every angle. "Learned scientists" were quoted to show the health-producing value of certain fruits and vegetables. Refrigeration cars, re-iced periodically during the long journey, rushed them to market at express-train speed. And fruits which the last generation had enjoyed only on special holidays became a commonplace necessity. Store counters groaned with a variety of fresh vegetables at all seasons, many of them new to the public taste. A comic-strip character with a nautical background and ophthalmic name plugged one vegetable so well that his statue stands in the public square of a Texas town which specializes in spinach.

The dietary habits of a nation were changed within two decades, and the alteration seems to be permanent. Much of the earlier advertising now seems almost superfluous. Every citizen is familiar with the vitamin-producing efficiency of the varicolored vegetables and fruits. Increase in demand has lowered costs to within the reach of almost every one, and acceptance of the vitamin dogma is almost universal. Search of several recently issued magazines catering to housewives found little advertising devoted to the

subject. But every sample menu, and they were legion, listed the very products so assiduously advertised only a few years ago.

While irrigation and modern refrigeration have transformed our thinking about food, there still remains the necessity to alter radically our concept of the place of water in the life of the nation. The water problem of the west is one of scarcity; that of the Mississippi Valley farmer is one of periodic flood. Yet the increased demands of industry and growing population upon the formerly adequate supply create concern among those who think in terms of a secure future.

This concern arises from the readily apparent outcome of our frontier attitude of mind, an attitude which says that each man is ruler of his own domain and that each state can control its own affairs without reference to the concerns of its neighbors. Unfortunately, the control and use of large streams is not a matter of local option. Some of them extend through several states. The activities of one state or community and its effect upon stream flow or pollution is the direct concern of all. Furthermore, the water underground, which supplies all wells and in many regions is of vital importance to citizen and industry alike, is not inexhaustible. This water originates as rainfall, part of which trickles slowly down into the earth to form a semi-permanent reservoir. It then seeps slowly into streams and maintains their flow during periods of dry weather. Springs flow

from this underground water, and all wells tap it for their supplies. Sometimes it is close to the surface, in other cases far underground. In regions where gently tilted porous rocks are exposed, water may enter and migrate underground for hundreds of miles. Long Island water comes originally from far inland, and the artesian wells of farmers on the dry plains of South Dakota yield the water which fell as snow in the Black Hills. Even on the flat glaciated plains, Galesburg, Illinois, uses moisture which first began its underground journey in Wisconsin—began it not long after the Puritan ancestors of Galesburg's Yankee founders first stepped on New England's granite shore.

Because this underground water is derived from rain and snow, years of drought reduce its volume. If the yearly withdrawal is greater than the annual increase, its level slowly falls; then wells fail and must be deepened. Even discounting the dry years of the thirties, the water level is falling slowly in all regions where wells are numerous.

There is a distinct connection between this growing scarcity of underground water and the flood problems of the Mississippi Valley farmer. Both trace back to removal of the grass and trees. When natural vegetation covered the land, water seeped away slowly. Without this vegetative brake, it rushes headlong down the slopes into the streams. During this rapid run-off, there is little opportunity for it to soak into the ground and renew underground supplies, so

one difficulty enhances another, and both hinge on the disturbance of wise nature's balance. The uniformity of stream flow has been disturbed further by unwise draining of head-water swamps by the land-greedy. These areas acted naturally as reservoirs which held excess water and drained it constantly into the streams, maintaining their flow during the dry seasons.

When Mark Twain was gaining experience as a steamboat pilot on the Mississippi, this upset of nature's ways was only beginning. Steamers navigated even the smaller tributaries without difficulty, and plied the main stem from St. Paul to New Orleans. Now it is necessary for the federal government to construct dams and dredge channels to keep even the Mississippi open. The difference lies not only in the lack of uniformity in stream flow from wet to dry seasons: the friable soils of hillsides, freed from the confining roots of grass, have filled the once deep channels. Striking indeed is the case of Galena. At one time it was the largest town in Illinois. Pictures of a hundred years ago show as many as six paddle-wheel steamers at once beside its busy wharves. To-day that same harbor is a grass-covered flat through which flows the Galena River, hardly deep or wide enough to pass a motor boat. And Galena, its lead deposits long since exhausted, watches the busy world dash by on the concrete highway.

Galena no longer needs a river, but there are many regions whose life depends upon one. Not only

because an uncontrolled river may mean death to their people and destruction to their industries, but because a controlled, obedient stream may produce prosperity and health for factory and citizen alike. These circumstances may be purely local, or may include large areas in a single state or even portions of several states constituting a single large drainage area. Unfortunately, our political boundaries were not drawn with regard to the exigencies of water use. Unless coöperative action for the greatest good of all be achieved, all suffer from the disunion.

One of the most successful stream-control projects within the confines of a single state was initiated more than two decades ago along the Miami River of Ohio. The Miami is a relatively small stream which rises in central Ohio and flows southward into the Ohio River. Industrial cities are crowded every few miles along its valley. In 1913 torrential rains fell on water-soaked ground to produce a violent flood which caused widespread damage. Arthur Morgan, college president, distinguished engineer, and later one of the directors of the T. V. A., was then asked to formulate plans for river control. Reservoirs were constructed along the head-waters of the river; channels were straightened and obstructions to water flow were removed; entire villages were shifted from the reservoir areas. The test of the system was not long delayed, for soon after completion, events almost identical with those of 1913 were repeated. The reservoirs filled slowly with

the excess water, which was allowed to flow slowly downstream. It raced rapidly through the lower course into the Ohio and damage was negligible. Now the Miami Project is a model for river control, and similar systems have been constructed elsewhere.

Control of the Miami presented no particularly intricate problems. Streams like the Delaware or the Connecticut Rivers, which are lined with industrial cities, criss-crossed with hydro-electric power dams, and polluted with the wastes of industries, present much greater difficulties. These can be solved only by thorough coöperation between the states and the federal government. Special interests, private, municipal, or state, may suffer. Yet regulation is badly needed. Eventually, perhaps, men who think of the nation rather than of sectionalism may gain the political power to restore the natural balance of full usefulness to our rivers.

Most unmanageable of all eastern rivers is that greatest of all flood-makers, the Ohio. It drains a region of steep slopes and high rainfall. Widespread torrential rains often cause floods simultaneously on several of its larger tributaries. When their crests reach the main river, the public is shocked by such catastrophes as the flood of 1937. It may be thought that floods are unusual, but actually the Ohio has reached flood stage at Cincinnati every year since the Civil War.

Although it is one of our most destructive rivers, the Ohio is also our most useful, since it carries more

freight than any other. In fact, the whole history of Mississippi steamboating dates from a flat-bottomed paddle-wheeler built on the Ohio in 1811. Just a few years earlier, vessels built in shipyards on this same river sailed to distant ports far across the Atlantic. Even now, small war vessels are being constructed on the Great Lakes. When completed they will sail down the Mississippi, never to return to the heart of the continent.

The Ohio is so useful because it is lined with industrial cities and flows from the heart of the coal country. Coal, oil, automobiles, limestone, fluorspar and other bulky commodities are pushed slowly up and down its channel. There are no immediate prospects of controlling the Ohio: its tributaries are too large and too numerous. But it may be possible to make a beginning by controlling one of these tributaries. Hence the TVA.

Those three initials, TVA, which stand for Tennessee Valley Authority, have meant many things to many men. To the political and economic conservatives they represent an uncalled-for interference by the federal government in what should be the concern of private industry alone. They mean meddling, competition between government and private capital, waste, boondoggling, and an unconstitutional invasion of the rights of the private citizen. And by the standards which prevailed while we were engaged in conquering the continent, the conservatives doubt-

less are correct. To the liberal-thinking men who initiated the experiment, TVA is an opportunity to prove that we should plan every phase of land use, since unplanned use may lead to catastrophe. They hold that use so conceived should result in a better land inhabited by a more prosperous, healthier, and more contented people. Whether they have planned wisely must be judged by the future. Since their scheme envisages social changes and economic rejuvenation as well as physical control of land and water, the success or failure of the entire TVA program will not be clear for many years.

The Tennessee flows through parts of seven states for almost a thousand miles. Its head-water tributaries rise in Virginia and North Carolina as well as Alabama and Georgia. Then the main channel loops westward through Tennessee, nicks the corner of Mississippi, and finally flows northward across Kentucky into the Ohio. It would have been impossible for any private company to handle the gigantic task of controlling this entire drainage basin, because of the conflicting and diverse interests of the several states and the capital needed. The federal government, however, has control of all "navigable" streams, and from this legal hook hangs the whole complicated structure. The political and financial jockeying which now has occupied the best part of a decade is retailed in the public press and government reports which cover this period. The results of

the attempt to harness the river are clear, and considered from that angle alone the experiment has been successful.

The first step was to plan control of the entire basin. Geologists, geographers, soil scientists, public health experts, and foresters swarmed over the region. No effort was spared to discover every pertinent fact about the area. Their purpose was eventually to harness the river for navigation and the production of electric power. Soil erosion was to be minimized, for it was severe throughout the basin. The average citizen was to be assisted by sale of cheap government power. Floods were to be prevented or at least kept below destructive levels. Forests were to be rejuvenated. And the abundant electricity was to be used to manufacture cheap concentrated fertilizer from the near-by phosphate deposits to raise the level of agricultural economy and increase the fertility of the land. Finally, the reservoirs were to become centers of recreation for the people, who were to have more spare time for enjoyment as their incomes increased and mechanical aids multiplied.

It is difficult to estimate objectively the success of such an all-embracing venture, even after eliminating its political and social aspects. So far, twenty-eight large multiple-purpose dams have been constructed or will be completed soon. It is estimated that they will develop almost three million kilowatts of electric power, to make the Tennessee

Valley the second greatest hydro-electric region in America. Sale of electric power to cities and individuals at low cost is greatly increasing its use. A nine-foot steamboat channel from Knoxville to the Ohio will soon be complete. Meanwhile, soil erosion is being checked and the Tennessee no longer suffers from severe floods. Even during the unprecedented flood of 1937, when the dams were only partially complete, damage was negligible.

What of the useful life of so expensive a project? Measurements made by government engineers show that the average life of power reservoirs in adjacent areas is only about fifty years, because they fill rapidly with mud washed from near-by sloping fields. In fact, a recent examination of many reservoirs throughout America shows that two-thirds will be effectively ruined by silt accumulation within a century after construction. Long before this their effectiveness will have been so diminished that they will no longer perform the tasks for which they were intended. On irrigation projects this will mean an increasing shortage of water, especially during dry years when most needed, with hardship for the people and withdrawal of much of the land from cultivation. Hydro-electric power projects will have insufficient storage capacity to maintain operations during dry weather and will have to install coal-burning machinery long before abandonment. Meanwhile, their water storage basins will be completely useless for flood control. The general picture

makes us ask whether we Americans have been thinking in terms of an ephemeral nation or one which will endure for centuries.

The TVA lies in one of the two regions where reservoir filling is most rapid. Those in arid regions where vegetation is sparse and rainfall is torrential perhaps suffer the most, but reservoirs among the steep-walled hills of the southeastern states also fill rapidly under present methods of land use. Even in the flat glaciated plains of the Corn Belt they show a decrease of volume which indicates an effective life of only 150 years.

With this possibility always before them, the TVA engineers have tackled the problem of land use with every means at their disposal. It is too early to prophesy whether silting can be controlled effectively. But the engineers believe that control is practicable, and the next decade will tell the story. If successful, TVA can stand as a working model for stream-system control during the future.

What of the immense cost of such a project? Is it financially worth-while? Like the cost of western reclamation, this can only be answered if carefully qualified. Certainly the federal government can not expect to receive dividends in the same fashion as a private business. But if the project is so maintained as to last for two or three centuries, the use of power and the greater increase in farm return, the savings in transportation and fewer losses from destructive floods should more than pay the bill. This does not

include the use of facilities for manufacturers during periods of national emergency. To-day these dams furnish electric power for aluminum fabrication and phosphorus production, as well as for concentrated fertilizer to help maintain an adequate supply of food for the nation and our allies. And research by TVA scientists may find a way to extract aluminum from the clay soils of the humid south. Meanwhile, the people of farm and city alike in the whole broad region see a new meaning to life, where for many the future had held only the monotony of want and the dull pain of hopelessness.

If the engineers are correct, the physical life of the TVA will be adequate for long use. Whether the small direct revenue from locks and power will eventually equal the cost is another question. Whether we want to shift from private to government ownership of certain resources is a matter to be decided at the voting booth. But the critical necessity for one important decision is very clear. We must harness our river basins or soon find large portions of them unfit as homes for men. The longer action is postponed, the more the ultimate solution will cost in economic waste, social maladjustment, and tax expenditure.

Far to the west of the Tennessee Valley, another mighty river likewise flows through seven states. But the Colorado is a fierce stream which flows through arid wastes and deep cañons. The treeless lands which border so much of its channel furnish vast

quantities of mud with which the river has built a broad delta completely across the upper end of the Gulf of California. The drying floor of the Gulf north of the delta, far below sea level, is called the Salton Sink. On its gently sloping sides men have now fought the burning sun and the raging river for more than four decades. The Colorado is finally harnessed. Farmers in the Imperial Valley turn its regulated flow between long rows of green crops. Housewives in Los Angeles see its water pour from a faucet and light their homes with its energy. For the Colorado, hitherto untamable, has met its match in a man-made dam: it will strike terror to the hearts of men no more.

This conquest of the Colorado was long in coming. For the river had been accustomed, as are all rivers, to meander at will across its broad delta, first down one slope into the Gulf, then down the other into the Salton Sink. When the first settlers came to the desert the problem looked easy, for they lacked knowledge concerning the age-old habits of rivers. All they thought they needed to do was to divert the water down the gently sloping delta surface. They reckoned without the unbelievable power of raging water in the soft sandy sediments. In the same year that an earthquake destroyed San Francisco, wild flood waters cut through one of the irrigation outlets and roared down into the Salton Sink across the green fields. Before it could be confined again, the Salton Sea had more than doubled in area, compelled

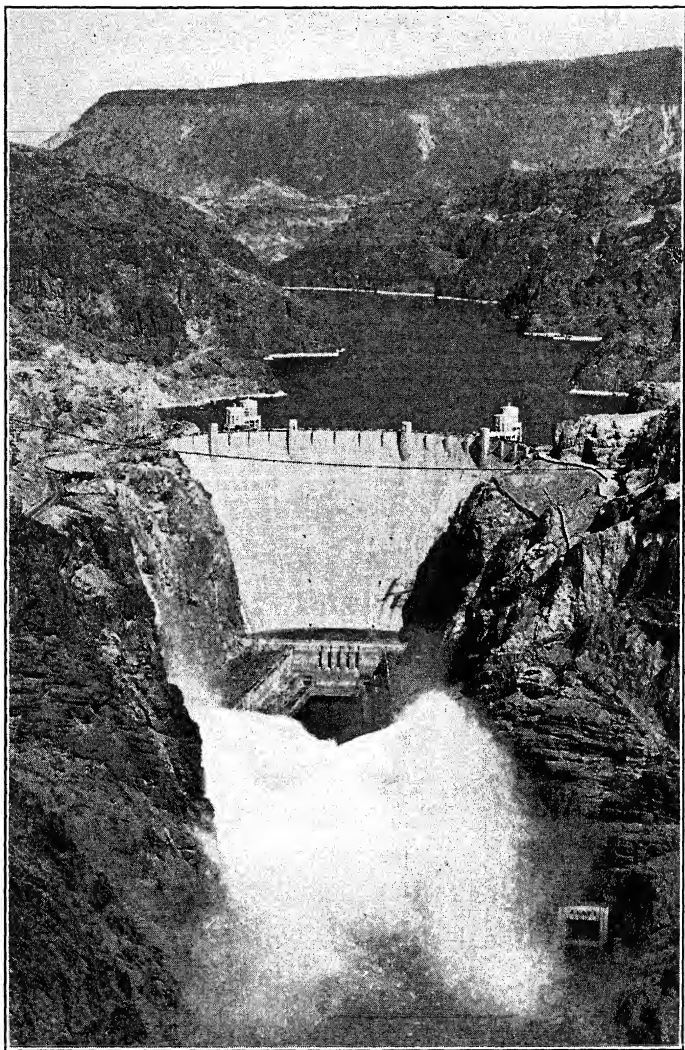
the removal of many miles of Southern Pacific Railroad track, and caused severe damage to Imperial Valley farms. Even after this danger was averted, the river still threatened with a flood yearly, when snow melted in the high mountains of Wyoming and Colorado. The immense volumes of silt in the muddy water choked irrigation ditches, which had to be scooped out periodically at great expense and labor. And below the Mexican border, where the main feeder canal for the whole area followed the line of least resistance, periodic political rumblings threatened permanently to cut off the life-giving water from the entire project.

Political difficulties were found also nearer home. Remember that seven states claimed the Colorado. It rose in the Rocky Mountains of Wyoming and Colorado, and was fed by the snows of the Wasatch, in Utah. Then it flowed for hundreds of miles through the deserts in New Mexico, Nevada, Arizona, and California. Each had a proprietary right, and the most possessive of all was Arizona. Finally, fifteen years after the great flood, and following years of political tug-of-war on the home front and in Washington, six of the seven signed an interstate agreement. Arizona still stood adamant; fortunately for the fate of the Imperial Valley, it made no real difference.

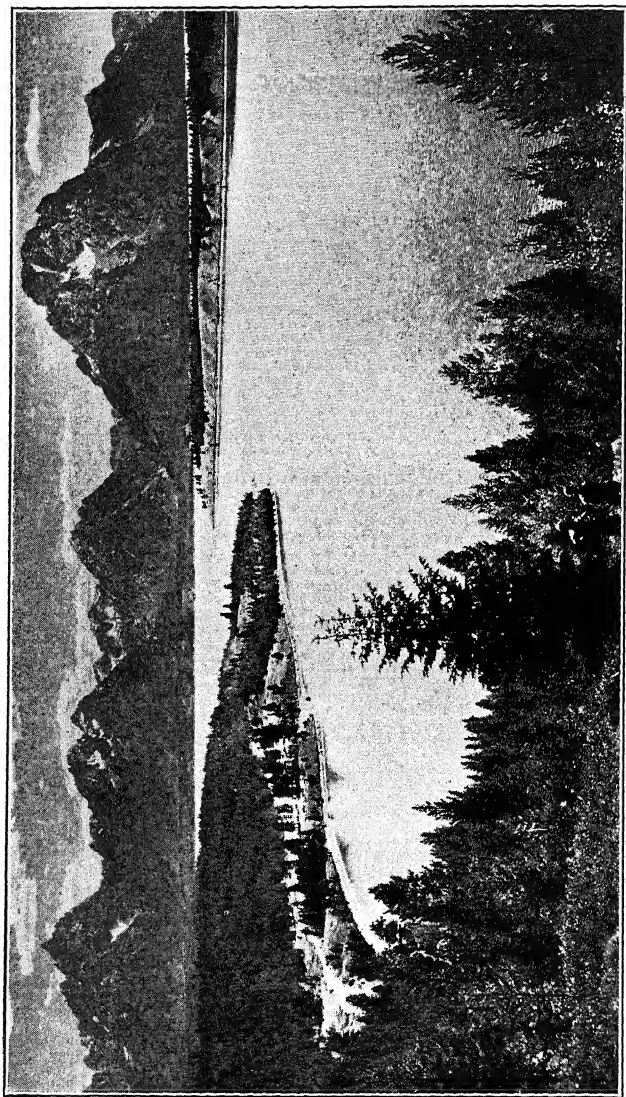
It took six years more of investigation and string-pulling before the Boulder Dam was started. The largest dam in the world to hold the world's largest

reservoir! A colossus among man-made structures, to tame the red waters of the Colorado. This was a typical American venture—on it depended the fate of a million acres of productive land and the livelihood of thousands of people. What they proposed was a dam more than seven hundred feet high—almost two hundred feet higher than anything men had yet attempted. It was to generate almost two million horse-power to light the homes and drive the industrial machines of southern California. (In these war years of supreme effort, it has proved indispensable.) Its water was to be released slowly each year to eliminate forever the danger of flood on the lower Colorado. And it was to pay for itself in fifty years, with interest. All this before the first dynamite blast echoed from the sheer walls of Black Canyon or the first worker's tent-house had been erected in the desert.

In common with the American tradition of constructing the impossible, it was done. No one company was large enough to undertake so vast and difficult a contract. So the Six Companies were formed as a coöperative enterprise to undertake the task. Primarily concerned was a dynamic man named Henry Kaiser. To-day he breaks production records by building ships with novel equipment and unorthodox methods. Boulder Dam required the same treatment: never had so much concrete been poured into one structure; never had engineering difficulties of such magnitude been encountered, and



Boulder Dam . . . venture of to-day—preface for
to-morrow.



“Beautiful in the warm sunlight.”

solved so rapidly. By 1936 the dam was complete. Two years later the Imperial Canal was opened to carry siltless water over American soil to a half-million acres of waiting land. Another half-million await only the demands of markets to make them productive likewise.

Out of this desert hothouse, paradoxically called the Imperial Valley, and from the near-by Salt River Project come most of the fruits of the tropics—dates, figs, grapefruit, oranges, limes, and lemons. Alfalfa may be harvested from four to six times each year. The long trainloads of lettuce roll out each winter, and the cantaloups each spring. Once the problem of water is solved, there awaits the threat of over-production.

Both Boulder Dam and the TVA represent a new kind of enterprise in America. Both were born in the thoughtful minds of far-sighted men. They are comparable in that each seeks to meet conditions which were preventing efficient use of our land, and both were constructed with funds furnished by all the citizens. Perhaps their most important similarity is that each is the result of coöperation and compromise between conflicting interests for the best interests of the whole nation.

But here the similarity ends. For the TVA has a far more complicated problem to solve. It faces the necessity for integration of all its activities to make an entire drainage basin more usable. Boulder Dam merely controls the physical might of a river and

generates power from it. Each is characteristic of its environment, TVA of the thickly settled and long-used humid east, Boulder Dam of the almost uninhabited west with its occasional clumps of population. Both may be symbolic of the future when we harness water to do our bidding even as we control the power of steam and electricity. Already Bonneville and Grand Coulee on the mighty Columbia far to the north prepare to direct its restless currents. Engineers are attacking the headwaters of the Ohio. Prophetic plans are in the making; the ventures of to-day are merely a preface for to-morrow. When that day comes our rivers will no longer run ceaselessly into the sea carrying our soil on their muddy shoulders. No longer then will our children have cause to reproach us as we blame those who have wasted our land before us.

CHAPTER EIGHT

"Stars in Their Courses"

STARS in their courses fix many American boundaries. For lines of longitude are determined by the position of the sun. And lines of latitude are not located by a tape line stretched over hill and dale from the equator, but by the height of the Pole Star above the horizon. Such an astronomical borderline divides the United States and Canada for thirteen hundred miles.

Glance again at a political map of the United States to notice the number of state boundaries which are lines of latitude or longitude. Tennessee, to cite one of the less flagrant examples, extends between two parallel lines across five different kinds of country. From east to west it contains segments of the Smoky Mountains, Cumberland Plateau, Nashville Basin, and a bit of the Coastal Plain that thrusts up along the Mississippi River.

The men who organized the United States after it became independent from Britain were very much interested in mathematics. The book which perhaps affected men's thinking in their time more than any other was published when Benjamin Franklin was

seven years old. This was the great *Principia* by Isaac Newton, which showed how the entire universe moved in accordance with certain universal mathematical rules that could also be observed in the relations of smaller material objects here on earth. For quite a while men wanted to believe that perhaps everything, even the society of human beings, followed such formulas. The constitution of the United States shows the influence of this belief, for it was designed as a kind of equilateral triangle, the three points of which were the executive, legislative, and judiciary. These were to keep each other in place by mutual action and reaction, just as Newton showed the heavenly bodies were kept in their orbits.

Now the United States in the days of Franklin and Jefferson offered a great opportunity to any one interested in geometry. Most of it was still untracked, like a smooth unfrequented beach where no one would object if you took a stick and traced lines to your heart's content. Jefferson, as a matter of fact, did something just like that to the country lying between the Ohio River and the Great Lakes. His Ordinance of 1784 cut that region up by six lines of latitude and longitude into ten parts. This portion of his scheme was rejected by Congress, but they did adopt his plan to survey all the land into rectangles six miles square before it could be sold to settlers.

On the large official map issued by the General

Land Office you can see the United States divided in this geometrical pattern everywhere except in the states organized before 1800.* There the settlers drove their stakes in a much less systematic manner. Elsewhere the east-west and north-south lines of government surveyors became an important phase of our geography. When the Iowa farmer or Arkansas sharecropper refers to a certain "forty" he means a specific one-sixteenth of the mile sections into which most of the United States is cut up. Four of these sixteenths make up the typical Corn Belt farm. Most of the roads in the nation still follow the lines between sections, and cross-roads are usually exactly one mile apart.

This practice of survey previous to settlement was wise. In the older states—Kentucky, for example—the settlers or land speculators tried to mark their own boundaries. Where the directions depended not upon the rather stable sun and Pole Star, but upon less certain landmarks such as trees, or creeks, or great boulders, there was often confusion. The land claims were frequently "shingled"—that is, overlapping. This meant good business for lawyers like Henry Clay but hardship for poorly educated pioneers like Daniel Boone.

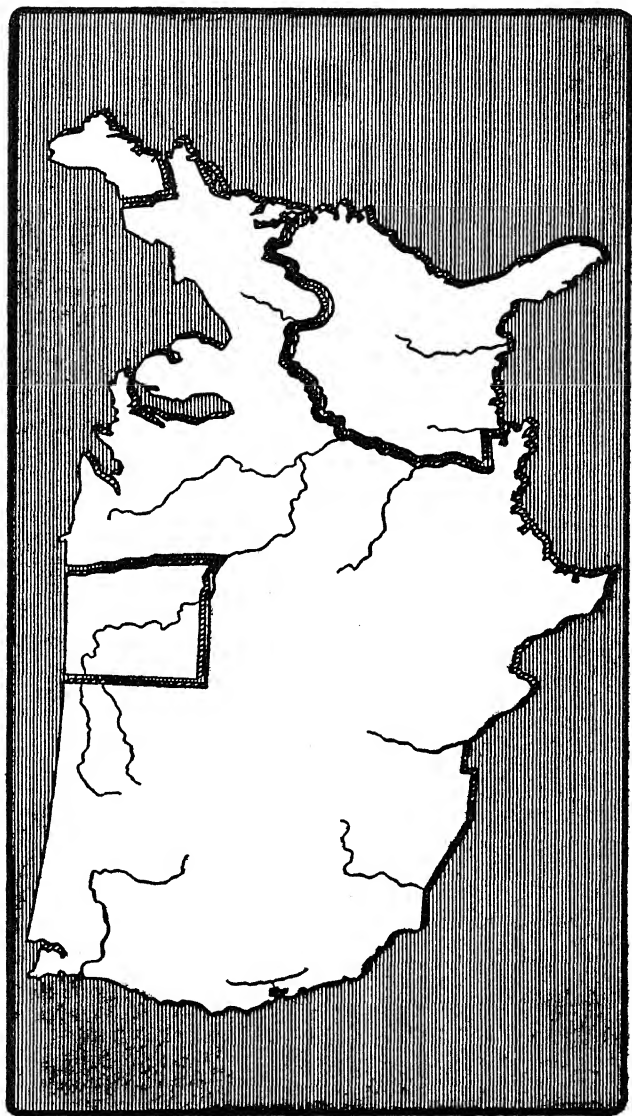
You will notice that as states were organized farther and farther west the state borders were more and more often straight lines. Even the Rocky Mountains were used as a boundary in only one case. This

* Texas is also an exception.

was partly due to the circumstance that the territories were outlined far in advance of actual settlement, when it really did not matter where the limits were put so long as they included roughly a certain area. It was also true that during the later stages of frontier advance, railroads and other improved means of communication made the physical features of the land less important.

Unfortunately, though most of our boundaries are mathematical rather than natural, they are not imaginary lines. They may express a narrow-mindedness, a selfishness, a petty pride that is harder to bridge than the Mississippi River and tougher to tunnel than the Sierra Mountains. Too much of our patriotism has been of the local Chamber of Commerce variety. The United States is no longer one unified country, as live-stock growers, milk dealers, beer and wine producers, truckers, manufacturers of vegetable oils, nursery owners, and many others can testify. During the last fifteen years, there have been at last thirteen serious motor-vehicle "border wars," during which the police authority of one state was used to discriminate or retaliate against the commerce of a "sister" state.

He who would draw a boundary line of any kind, straight or wandering, river or mountain, should be a wise man indeed—perhaps wiser than is man. Certainly he should have many dependable facts at his command. Unfortunately, accurate geographical data was not available when our first "permanent" bound-



How state laws regarding twenty-ton trucks carve up the Union.

ary line with Canada was projected. At least three questionable parts of the indicated border provoked such honest difference of opinion as to postpone a final decision until sixty years after the close of the Revolutionary War. The name of one of the rivers to bound Maine was applied to two different streams. Another uncertain specification was a mountain ridge which proved to be imaginary. Because the true geographical facts could never be fitted together, the affair was finally settled in 1842 by an outright compromise. Not until then was the northern limit of New England certain. At that time, the American diplomats thought they were lucky to possess an old map which seemed to support the British claims. That they did not reveal it to their opponents in the boundary-fixing game turned out to be fair play; that is, if one foul deserves another. For the British foreign office failed to display another old map which indicated that the line for which the Americans had argued was substantially correct.

Mention of this duplicity should not suggest that the history of our Canadian border has been one of diplomatic trickery. Far from it. Most of it provides the rest of the world with a model of fair and judicious settlements of differences. At times, of course, America had to tolerate the tireless willingness of Britain to assume new imperial responsibilities. On the other hand, Britain often had to be patient with the cockiness of her adolescent offspring, who did not realize the limits of his growing but immature

strength. In one notable instance the British gave way when they had an extraordinarily strong case. It had to do with the boundary west of the Great Lakes. The treaty at the close of the Revolution asked for the impossible—a line from the north shore of Lake Superior by way of Lake of the Woods west to the Mississippi River. This would give the British access to the great river on which we agreed they should have the right to navigate. Geographic exploration revealed, of course, that the source of the Mississippi lay far south of the Lake of the Woods. The British then argued that to fulfil the obvious intention of the treaty, the boundary should be drawn farther south, west from the tip of Lake Superior. This would have been quite a sensible boundary, and many Americans think that it is located there. In acceding to American insistence on its present location the British were even more benevolent than they realized. The Mesabi iron range was later found within the part of Minnesota thus secured to the United States.

Erection of that very long, extremely artificial border-line, the forty-ninth parallel, requires a lot of explaining. How did it become an effective barrier to the extension of American nationality? Barring a few historical accidents, our frontier might very well have gone north instead of west. Suppose that Captain Robert Gray had been wrecked rounding the Horn, and American commercial interests in the Pacific Northwest delayed fifteen years until the British were securely established in the river that

Gray named Columbia? Eliminate that incident, stranger than fiction, of the Flat Head Indians who showed up in St. Louis to ask for missionaries and thereby to advertise Oregon. Suppose that "fifty-four forty" had not made a good alliteration with "fight" to furnish a campaign slogan for the presidential campaign of 1844. Imagine that the chance discovery of gold in California, which had already waited seventy years, had been postponed only another twenty. After all, the concourse of circumstances which had caused the Oregon-California migration had been rather fortuitous. Grant a half-dozen very plausible "ifs," and it is reasonable to conjecture that the Rocky Mountains would have been fixed as our western boundary. Instead of jumping to the Pacific our frontier must then have continued its expansion along the central plain of the continent into what to-day is western Canada.

One could walk from Galveston, Texas, straight north to the Arctic Circle without rising more than two thousand feet above sea level. The great central plain extends from the Gulf of Mexico to the Arctic Circle without interruption. It was actually easier to get to Saskatchewan from Alabama than from Quebec, for the rich prairies of western Canada are separated from the fertile valley of the St. Lawrence River by a barrier nine hundred miles wide. This obstacle is the so-called Canadian Shield, which lies between the Great Lakes and Hudson Bay. It is to this day largely wilderness because of the abuse it

suffered from the glaciers. In many places, where it was scraped clean to the very roots of ancient, worn-down mountains, it is hard rock so smooth and barren that vegetation can not take hold. In other areas there was deposited only a thin, irregular residue of gravel and boulders, which is still too fresh to be useful for agriculture, though it may grow trees. Elsewhere, the ice-sheet dumped its debris into the older river valleys and prevented the land's drainage, thereby creating a water-waste of lakes and swamps.

So effective was the separation of the Gulf of St. Lawrence from the plains beyond the Canadian Shield that as late as 1857 there was only one agricultural settlement west of Ontario. It was located in the Red River Valley of modern Manitoba. There it sat on the floor of an ancient lake formed while the retreating continental glacier still dammed the waters which now run off to Hudson Bay and the Arctic Sea. This isolated community discovered that its best connection with the rest of the world was not to British America but to the United States, by way of a river valley that once had drained the ancient lake into the Mississippi. A yearly event in the very early history of St. Paul was the arrival of an ox-cart caravan from the Red River Settlements. They came along the ancient ice-age outlet to the Mississippi, now occupied by the Red River of the North and the Minnesota. By 1858, they were bringing to that town about \$200,000 worth of frontier goods. Canada, as

a matter of fact, did not rule this western community, and when it sought to extend its authority there rather abruptly, the inhabitants rebelled.

Previous to 1869 the vast area of western Canada was owned and governed by the Hudson's Bay Company. The boundary along the forty-ninth parallel derives from an incident in the history of that company. This happened after a war with the Bourbons of France and Spain, from whom Britain in 1713 secured two important commercial concessions. One gave to a British company a monopoly of the slave trade in the Spanish colonies. The other conceded expansion of the Hudson's Bay Company into the fur trade of the interior of North America, which France previously had controlled. The agreement set a southern limit to the territories of the British company. This was the forty-ninth parallel.

The American state department insisted that territory which was out of bounds for the Hudson's Bay Company should lie beyond British sovereignty. In 1818, while negotiating a commerce treaty, Britain agreed to accept the limit of forty-nine degrees of latitude as far as the Rocky Mountains, but refused to extend that boundary to the Pacific until 1846.

While it was still new, the boundary must have looked even more tentative than it does now. It seemed like the mark that determines the winning team in a rope-pulling contest. Eventually weight of numbers would surely pull the Canadian plain into the United States. Our secretary of state once

suggested to an American capitalist that it be done by buying control of the Hudson's Bay Company, which is exactly what Canada did, not long after, in 1869. Occasionally quite a number of Canadians were inclined to concur with what their neighbors south of the border frequently assumed was the inevitable annexation by the United States. Such talk became less as railroads tied eastern and western Canada closer and the populations on either side of the Canadian Shield grew up together into a mature nationality. Despite the large-scale migration of American farmers into the western provinces during the decade before World War I, Canadian independence was not really endangered. Conservative politicians did find, however, that it was effective campaigning to view the possibility with alarm.

To-day most Americans seem to accept the forty-ninth parallel and the rest of the boundary as one of the fixtures of their lives. Only a few of them are unable to admire and to enjoy the garden next door without being able to own it. Probably no other boundary in the world has been so sensibly administered. So wisely has this been done that it is now more significant for what it includes than for what it separates.

For more than thirty years there has been an International Joint Commission to oversee our mutual use of the border lakes and rivers. It measures and apports the water used for irrigation and power plants, it prevents pollution, and it passes on any obstruction

or diversion. For example, a dam raising the level of the Lake of the Woods might be acceptable to navigators and lumbering men, but objectionable to farmers whose farm-lands would be drowned. The commission would set the level at which the lake must be kept. How varied such problems may become was illustrated by a case about ten years ago in which the Joint Commission assessed damages of three hundred and fifty thousand dollars against a Canadian mining and smelting company. From just over the parallel its sulphur dioxide fumes drifted down the Columbia River valley and damaged timber, crops, and soils in the state of Washington. The commission also told the smelting firm by what methods future injuries should be avoided.

Americans certainly do not look upon Canada as a foreign country. A year before World War II broke out, President Roosevelt in person declared to Canadians, "I give to you assurance that the people of the United States will not stand idly by if domination of Canadian soil is threatened by any other empire." Two years before Pearl Harbor was attacked, Canada had already joined us in a Permanent Joint Board on Defense. One notes that word "Permanent."

To our common shame in the past, and our present regrets, the story of the Mexican boundary is not so happy. From a purely geographical point of view, our southern border is a better one than the northern. In Canada the population is most dense along the boundary, which therefore does interfere with

the inclination of human beings to get together—as for example between Detroit and Windsor, Ontario. In Mexico the population is concentrated in the central plateau far to the south, along with the wealth and the political power. The heart of the nation always has beat at Mexico City, and the pulsation was never strong in such extremities as San Antonio, Santa Fé, and San Francisco. These are separated from the pleasant, fertile plateau about Mexico City by hundreds of arid miles along which population remains extremely sparse. The irregular line from the mouth of the Rio Grande to the delta of the Colorado thus interferes with the lives of very few people. Here the vigor of both Mexican and American social institutions weakens: it is the land of the Indian raider, cattle rustler, smuggler, gambler, and divorcée. It is productive of a kind of lore that makes cheap and profitable combination with the wood pulp of the Canadian Shield.

Most of the border troubles require only care and effort to keep them under control. There is one problem, however, that only sensible give-and-take can solve. That is the sharing of the water of the Rio Grande and Colorado Rivers, of which there is not nearly enough to irrigate all the deserving dry land on both sides of the border. Except for the lower part of its delta, which belongs to Mexico, the Colorado flows through United States territory all the way. But does Los Angeles, on the other side of the mountains, have more right to the precious water

than Mexico, which controls the mouth of the river? In the case of the Rio Grande we use all its water up to the point where it becomes a boundary stream. Through the remaining thirteen hundred miles that we share with our southern neighbor, practically all the water comes from Mexican tributaries. How much of it may we demand as our portion? It is to be hoped that a method for settling this irrigation problem will be found which is as satisfactory as the method now used to settle disputes caused by the frequent shifts of the Rio Grande Channel. For nearly fifty years, these have been adjudicated by a permanent international commission.

The border between the United States and Mexico is really also the southern boundary of North America. It is true that by geological structure the continent extends down to the Isthmus of Panama, but in most other respects it ceases at the Rio Grande. North of that limit the climate ranges from temperate to frigid; southward the rest of the land mass of our hemisphere generally has a tropical climate. Only the last slender wedge of South America reaches into the south temperate zone, and none of it touches the Antarctic Circle. North of Mexico there is political unity and stability, for there are only two nations, and these enforce the same Common Law. The rest of the New World is less closely knit. It is divided into seventeen independent states, exclusive of three island republics. In addition, there are several European colonies. Though most of these are

particles of the same Iberian culture and use the Roman law, they are much less homogeneous and often less orderly than the United States and Canada.

Despite the differences between Latin and British America, however, the entire Western Hemisphere has a oneness of its own. For example, citizens of any North or South American Republic may immigrate into the United States freely, though only a regulated quota of Europeans may enter in any year, and Asiatics are excluded entirely. Though it has never been surveyed or etched on a map, a very real boundary surrounds the New World. It was first defined and described in an address to Congress made in 1823 by the President of the United States. He declared that the American continents were closed to Europe for further colonization, for expansion of political institutions, and for interference in the affairs of American Republics. This separation of the Western Hemisphere from the political system of Europe was called the Monroe Doctrine.

Americans must not think of the Monroe Doctrine as the patented invention and original property of American diplomats. The idea was suggested to the United States by a brilliant English foreign minister and was first planned as a joint venture by both countries. That it should be done in combination with Great Britain was the opinion not only of Monroe but of Ex-Presidents Madison and Jefferson as well. As it finally turned out, the declaration was made by the United States alone, but the actual diplomatic

arrangements, which made sure that threatened European intervention in the Latin-American republics would not occur, were made by Great Britain.

Despite frequent periods of disagreement accompanied by hot-headed talk, the two English-speaking nations had working agreements which were rather effective in the Atlantic Ocean. Without the aid of the British Navy we could at first hardly have maintained the independence of the Western Hemisphere against continental Europe. We certainly could not have done so against that sea power. As it was, we shared the guardianship. American fishermen were admitted to the waters of British Nova Scotia, Newfoundland, and Labrador. The development of a huge American merchant marine entered into competition with British shipping. On the other hand, we had to be patient with the meddling of the British in Texas and tolerate her claims in Oregon and California. Even though the Monroe Doctrine forbade further colonization, we did nothing to prevent British seizure of the Falkland Islands from Argentina. In Central America, the conflicting interests of the United States and Britain were straightened out in a treaty in 1850, which promised that neither power would secure and maintain for itself exclusive control over a canal built through the Isthmus.

If deprived of the barrier of the Monroe Doctrine, the map of the western world without a doubt would look very different. It was not moral scruples that kept Europe out of Central or South America during

the years when Africa was being carved up and "backward" countries in Asia were being "developed." A sample of what might have been was furnished while the United States was preoccupied with its Civil War. At that time, the British government was unfriendly. Napoleon III and French bayonets established a Hapsburg protégé as ruler of Mexico, and Spain made war upon her former colonies along the Pacific coast of South America.

Guardianship of the New World became the solitary preserve of the United States during the last quarter of the nineteenth century. It was against Britain itself that an American secretary of state directed the most rigid of all official definitions limiting European interests in our half of the planet. Britain, after a rather exciting argument, virtually conceded our position as arbiter of affairs in the Western Hemisphere. Four years later, in 1900, her surrender of a mutual interest with us in Latin-American affairs was signalized by an important treaty. In this agreement she gave up her fifty-year-old right to insist that any canal across Central America be shared by both United States and Great Britain.

A man owes it to his neighbors to keep his yard in order. By placing a limit about the Western Hemisphere, we had a similar obligation to the rest of the world. As a consequence, the United States could not avoid acting as a kind of policeman in the Caribbean, where our neighbors were small and feeble, particu-

larly disorderly, and inclined not to pay their debts. Some of them were remnants of French and Spanish colonial empires, since withdrawn from the western continents. Chief of these was the derelict island of Cuba. There American interests were especially strong because it produced a large quantity of sugar, the one food staple that was not available in sufficient amount at home. Cuba came under our protection in 1898. We annexed Puerto Rico at the same time. And for twenty-five years, thereafter, we threatened to make the Caribbean our own sea in the name of order and the safety of American investments. The method varied. Here we sent in the Marines; there we gestured with a battleship; once we sent in a considerable army. Sometimes, we took over the finances; again, we also administered the police; in one case, we conducted the elections. Only once did we create a new republic, but several times we altered governments. Two of the islands and a strip of the Isthmus, we annexed by purchase. Mexico, Nicaragua, Panama, Colombia, Haiti, and the Dominican Republic all suffered particularly the vigor of our expanding authority. The establishment during the last two years of American military and naval bases in the British and Dutch Islands of the Caribbean is by way of continuing a process that has been under way for forty years. The force of our leadership in this area was demonstrated by the manner in which the republics north of the Isthmus joined us in World War II.

The Latin countries which do not touch the Caribbean have never been so obviously incorporated into the sphere of American empire. But as the Colossus of the North bestrode the hemisphere from the Aleutians to the Panama Canal, the nations of South America naturally became alarmed. Though they respected the protection which the Monroe Doctrine afforded them against Europe, they resented the proprietary manner in which it was administered by the United States. Some of them became inclined to call in the Old World to redress the balance of the New. When Spain, imperial mother to most of them, became Fascist, it seemed not unlikely that they might join a political movement hostile to the democratic institutions of the United States.

Fortunately, Hitler's grasp of power in Germany coincided with a "New Deal" for the Monroe Doctrine. During the middle thirties American diplomacy set out to change the one-sided management of the Hemisphere into a coöperative responsibility. President Roosevelt announced that the United States "from now on" would not resort to armed intervention, promised that the breakdown of order in any of the New World republics would be the common concern of all its neighbors. As a solid token of good faith, the United States withdrew from Haiti and gave up its lawful right to interfere in the affairs of Cuba. This "Good Neighbor" policy has made it easier to develop that Pan-American unity regarding which there had been years of talk with little accom-

plished. During the last six years noticeable progress has been made in erecting within the bounds of the old Monroe Doctrine some kind of hemispheric federation.

No diplomatic dike such as the Monroe Doctrine was ever built in the Pacific Ocean. Its other side, though densely populated, was occupied with dormant civilizations which indicated no expansive tendencies until the very end of the nineteenth century. Whereas the exclusion of Europe from the New World implied no American involvement in Europe, in Asia the United States was restrained by no such understanding. The interests and ambitions of the United States in the Pacific Ocean are as old as the nation itself: the very first American naval force to appear in the Pacific in 1813 interfered in the native politics of the Marquesas Islands, conquered the more important tribes, and took possession in the name of the United States. The first government to have official representation in Oceania was the United States.

Undoubtedly, it was not until the dramatic victory of Dewey at Manila Bay that most Americans realized the scope of our gradually accrued position in the Pacific. Yet it was in China that Dewey's fleet had been stationed—in China, where we had shared with Britain and France and other European states the very important diplomatic privileges that were forced from the Manchu rulers. For thirty years, we had possessed that “arch of the Pacific” formed by

Alaska and the Aleutians. For a generation the Hawaiian Islands had been an American protectorate, and as our minister there reported, "The pear is now fully ripe . . . for the United States to pluck it." In the South Pacific, at the Samoan Islands, we owned and controlled one of the very best harbors and trans-oceanic stepping-stones. We had secured it in a diplomatic deal with Germany and Britain not at all different from the technic used elsewhere to divide the world among European peoples.

Meanwhile, in scores of missions, hundreds of American clergymen, teachers, and physicians spent thousands of American dollars. These had been contributed in order that the United States no less than Europe might bear the "white man's burden" among our brown and yellow "brothers."

There were those in the United States at the turn of the century who did appreciate our place in the Pacific, and were intent on making something of it. They had their own decided convictions of what the proper rôle of a full-grown nation ought to be. In addition to certain younger senators and congressmen, there were, among others, a world-famous writer on the importance of sea power in history, and an aggressive Assistant Secretary of the Navy, who gave Dewey his orders, led the Rough Riders, and shortly became President of the United States. In the end these men, together with chauvinist newspapers and sugar importers, had their way. We annexed the Hawaiians, took the Philippines, and

acquired the intermediate island of Guam. In order to bring this empire close to the Atlantic Coast, we then secured control of the isthmus and built the Panama Canal.

Whether the American people ever actually concurred with this manner of reinforcing our position in the Pacific Ocean was never determined by any clear-cut political contest. Fifty years later, there was in many places a startling lack of enthusiasm for imperial ventures so far away. That passivity the Japs at Pearl Harbor on December 7, 1941, may have changed into an aggressive interest forever.

The formation of the American empire in the Pacific was contemporaneous with the emergence of Japan as a nation of the first rank. Until after World War I, however, the security of the United States was not threatened. The other imperialistic nations agreed with us on maintaining an open door in China. The Philippines gave us an excellent gate to the Far East. By way of Guam, Wake, and Midway, our connections with the Philippines were good. In the Hawaiian Islands we held the strategic ace of trumps, for these were literally the cross-roads of Pacific traffic. The water communications from Canada to New Zealand and Australia, from Singapore to Panama, from Hong Kong to San Francisco, all passed through or near them.

After World War I, our Pacific situation was altered. Japan had become stronger in China. The redistribution of German territory gave to Japan the

islands lying north of the equator; these encircled Guam and lay athwart our route to the Philippines. So long as these islands had belonged to a European nation half-way around the world from them, they could hardly be developed into a serious danger to the United States. But when the Versailles Treaty put them into the control of Japan, they became a direct extension of the might of a Pacific power able to use them very effectively.

The Hawaiian Islands now became not merely an American approach to Asia, but also our last possible outpost of defense against Asia.

As we all learned.

CHAPTER NINE

Unmanifest Destiny

MANIFEST destiny was a mirage. Our present is not a fulfilment of the future on which the America of one hundred years ago fixed its faith. If the finger of God wrote our history, then verily it moved in mysterious ways, however wondrous the sentences are to behold. If men were the masters of our fate, then they were most astoundingly lucky. We certainly have had most of the "breaks." In our national egotism over wealth and strength and health and wisdom, we are like the men who made fortunes by gambling bullishly on stock-market tips. Somehow we couldn't lose. Time and again we were enormously and unpredictably fortunate. The Louisiana Purchase was not planned ahead of the event; no one piled up the Mesabi iron ore or placed it so favorably; no human agency guaranteed the frontier farmer that if he would merely hold on to his land and live by it, he would have a tidy little fortune before he died.

Americans worked no harder, sacrificed no more, schemed no better, and dreamed no more than millions of men in many other places of earth. America

as a child of good fortune has no provident insurance against idleness, selfishness, carelessness, and narrow-mindedness in the future. There is no planetary investment firm holding our heritage for us in trust. And we have neither reason nor right to believe that our future will be as consistently lucky as our past.

Some cosmic physician should impress the truth upon Uncle Sam that he is approaching middle-age. The symptoms are plain: in a few years he will have reached his full size. The rate of his growth is declining. On this matter the records and calculations of the population experts are convincing. They predicted the figures of our last census with impressive accuracy. And it is their opinion that by 1970 our population will reach its greatest number. The total will be only 25,000,000 greater than the present, and the average age of our people will be older than it is now. We will no longer be a youthful nation.

This aging of our inhabitants is simply explained. In general there have been three factors which contributed to our phenomenal population growth in the past: decline of the death-rate, a persistence of high birth-rate, a large immigration. Of these only a declining death-rate remains, and only new medical miracles can keep it from becoming stable. Our immigration was sharply reduced and fixed, in 1924, to one hundred and fifty-four thousand persons annually, which is only a very small fraction of what had usually come over in the years before World War I. We still do not have enough perspective to estimate

the importance of that legislation. In effect it put a heavy brake on one of the most dynamic forces in our history.

The stark fact now is that Americans live longer to reproduce less. Many of the very conditions created by our population growth discourage further enlargement. Parenthood, particularly in cities, has become an economic penalty, a social impropriety, and a personal shame. The new career woman blasts motherhood with pity, while landlords bar their apartments to its progeny.

For good or evil, with the stabilization of our population one of the wheels of our western civilization is slowing up. How the course of American society will veer as a consequence it is hard to tell. The days may be past when Chambers of Commerce could predict confidently an increase in city population; gone are the years when land anywhere was almost sure to rise in value because more people would bargain for it, when school buildings had to be built oversize to accommodate coming generations. The time is at hand when a growth in population in one place will mean a decline elsewhere—when a successfully managed real estate boom will probably rob some other district of its property values.

As a fact of world geography, this condition of American population is very important, especially in the Pacific. Three-fourths of the way around that ocean, the lands have what is comparatively a sparse

population. These extend clockwise from the Aleutians, along the coasts of the Western Hemisphere, and include New Zealand and Australia. The other short one-fourth of the circle (from Java through China to Japan) contains lands very densely inhabited. There is as yet no clear indication that the populations in these most densely settled countries are reaching their maximum. Hence there is a very unbalanced distribution of population around the Pacific Ocean. A wise foreign policy or effective world organization must be planned with realistic attention to this circumstance.

As yet none of the war's tragedies are so disturbing as the pathetic failure of American public opinion to grasp these facts, to demand war and peace objectives that will take such harsh realities into account. It would be easier for the thoughtful citizen to thrill over the Four Freedoms if he could believe that his fellow-voters meant to establish those principles on the basis of what is the truth about the nations ranged around the Pacific. There are, for example, the four hundred million Chinese. Liberate them, allow them to fashion their own destinies, equip them with modern technology: assist them, as we promise, out of the weakness of want, encourage them to nationalistic self-consciousness. What then? There will be, within a generation, a tremendous new community, a nation that has not stopped growing, a first-rate power such as the world has not yet seen. What, then, about the Philippines? To

whom shall the stepping-stones across the Pacific properly belong? Could Asia possibly stop at the Hawaiian Islands?

What seems overwhelmingly certain about our international status in that future is that any self-sufficient American nationalism would be puny indeed—a sand-house modeled on the beach while the sea of humanity had been at low tide. A sensible, orderly, and equitable world system, in which we would share security, could be the only rational policy. On the Pacific it is elemental to our own future, not to Asia! Our very recent gesture in giving up extra-territorial privileges in China was comic.

We simply must adjust our American policy to the facts of human geography, to the facts not merely of population distribution, but also of language, race, and living standards. Our record here has been none too good, as for example in Latin America. Until very recently, there has been little effort made to prepare ourselves to use Spanish and Portuguese, the speech of the very people whom we would persuade into a friendly hemispheric federation. Even when we have learned their speech, we are hardly able to understand these neighbors, because we know less about them than about ancient Greece.

It probably does little good to condemn the color-line which complicates our position in the Pacific and in Latin America. We will hardly solve a problem of racial psychology by dealing with it indirectly in foreign affairs. So far, we have done very little about

this issue at home, where we face it directly. It may prove to be an incurable blemish in our national anatomy. But if it is a congenital Achilles heel, it will be dangerous to forget our vulnerability at this point. A new China, quickened to a keener sense of its dignity in the family of nations, may be quite as outspoken about the treatment of Orientals in our Pacific states as was Japan. As for the millions of Negroes among us, who knows when, "to keep them in their place," some white Pullman conductor will unforgivably insult a dusky ambassador from a Caribbean republic whose friendship our state department had carefully cultivated.

Which reminds us of the dictum of a committee appointed by the President of the United States ten years ago. It pointed out that our country was a colonial power without a well-developed colonial policy. Will the racial complexion of Hawaii forever prevent it from receiving statehood? Will Puerto Rico never be honored with political adulthood, forbidden independence because of its strategic location, denied sisterhood within the United States because her people are not good enough for Alabama or Arizona? Will we ever remove from the course of Cuban politics the hazards placed there by sugar lobbyists, not in Havana, but in the District of Columbia?

Possibly the most important observation to make about American colonial and foreign policy is that it has not been supported by the people. Not that the public has frequently been opposed to the diplo-

matic activity of the federal government, but that it has never been continuously interested. Domestic issues rather than foreign affairs have determined the outcome of elections. This apathy to our relations with nations abroad was certainly the rule before 1914, and recurred after 1918. Any teacher of history, politics, or economics will agree that only a few exceptional students on a college campus express any steady interest in international problems; of these, most are interested emotionally, in much the same way as were student missionary societies forty years ago; very few reveal any systematic information.

This inconsistency and undependability of public opinion is of course very vexing in formulating foreign policies. In a democracy we must pretend that every voter is a competent critic of the external affairs of the nation. Actually, most of the voters are susceptible to the most ignorant or unscrupulous kind of demagoguery on international issues. The professional politician knows that the easiest way to win an election is to oppose something. The American republic stumbles through like a blind giant guided by the imps on his shoulders.

Only in the Western Hemisphere does the ordinary voter have rule of thumb by which to evaluate our diplomatic activities: that, of course, is the Monroe Doctrine. It has always been his vague impression that in the rest of the world we generally tried to stay out of other nations' affairs. He does not know the important truth that our course in Asia has been

one of frequent interference and of rather close and constant collaboration—that is to say, of “entangling alliances.” On the other hand, it does no good to pretend, as some propagandists attempt to prove now, that we have always had some finger in European affairs. Until the twentieth century that was not true. Rather, we must learn to understand how isolation has become a dangerous policy now, because of the circumstances of history and geography.

The habit of relating political behavior to the realities of geography had better be formed at home; in fact, it may not be possible to form it in any other way. Like the absent-minded businessman who can not remember what he ate for lunch or what the color of his tie is, many Americans can not tell you such “obvious” facts about their geographic position as the township or ward in which they live, to say nothing about their congressional district. The cause is not far to seek: such political geography has come to be meaningless. No amount of agitation for civic virtue can correct the unwillingness to take obsolete or artificial political groupings seriously. There has been no basic reconstruction of our local government since many generations before the American Revolution. In an urban civilization we still use the same primary units of government that were suited to a rural society. If we are to avoid the increasing centralization of government in our state capitals, the facts of our geography must be recognized in vital municipal subdivisions that coincide in their juris-

diction with the living habits of the people. The law still pretends that people live in townships and counties, but more of our citizens live in metropolitan districts. The latter have an economic and social and cultural reality, recognized by their inhabitants. The suburban dweller will, of course, admit that he is a creature of the greater city near which he dwells. For selfish reasons, such as taxation, he may resist the incorporation of his satellite village into a larger unit of municipal government, but he can not fail to realize that some inclusive and partly self-governing metropolitan government would best fit the facts of urban geography.

When artificial or even natural state boundary lines carve such metropolitan areas among several state sovereignties, responsible government is even more frustrated. The same difficulty, however, may arise less dramatically in dealing with governmental problems not necessarily urban in character. Our state boundary lines ignore completely the actual extent of the soft coal field of the Middle West, or the oil pools of the Southwest. Thus far only unwieldy and awkward devices of interstate coöperation or federal interference have been possible. We must hope that the new emphasis in studying American life regionally will produce leaders in this generation who will reconstruct government on a sounder basis. The decadent political forms or historical accidents used in the present geographical structure of our government must be discarded. The actual location of our

several populations, the facts of soil, climate, resources, the lines of human communication, and similar truths, offer substantial principles upon which a more sensible federalism may be rebuilt. Such a revised federalism would not need always to give way to the trend toward government from the top down. The somewhat haphazard geographical division, fashioned for most parts of the United States a century or more ago, often are not at all arranged to fit the environment as it affects us in the twentieth century.

The peculiarities of our federalism were considerably to blame for the great national mistake we made about twenty years ago. The ordinary voter who learned his foreign policy from the head-lines was misled by the political events of 1919, 1920, and 1921. He believed that the Senate of the United States had readopted for the nation the policy of non-participation in European affairs. What actually happened was that the treaty containing the League of Nations was unacceptable to a minority of the federal part of our national legislature. The casual observer of events did not realize (or he overlooked) an important geographic fact, that the United States Senate is not organized on the basis of proportionate representation of either population or wealth. This distortion of the national will is all the worse because of a constitutional technicality outmoded long ago: namely, that one senator more than a third of the house can defeat a treaty. The requirement of a

two-thirds majority for ratification of treaties was put into the constitution because it was expected that the senate would be a small body, perhaps of no more than two dozen members. Sometimes accidents, illness, or chance, might make it possible for a very small number to adopt a very important treaty. No one expected that some day there would be almost a hundred senators.

The defeat of the League of Nations proposal by the senate was therefore of very uncertain political meaning. It was not at all true that the vote of the upper or federal house meant that a majority of the people wanted to go back to isolationism. Isolationist propagandists, however, had the advantage of being able to say that the nation was committed to isolationism—and thereby hangs a long tale of politics.

The senate may oppose, but the President must dispose. The executive branch of the government, responsible for the day-to-day management of foreign relations, discovered that it was simply impossible not to participate in European diplomacy. To refuse was to endanger the safety and to imperil the welfare of the nation. Even Congress, as early as 1921, legislated a new division into the Department of Commerce to assist the development of our foreign trade. Our exports and investments abroad grew apace. Incorporated industry was very conscious of this fact; the individualistic farmers were less aware of it. The truth was that within ten years of the

Armistice we sold one-sixth of our wheat, two-fifths of our tobacco, and over one-half of our cotton in foreign markets.

These foreign business entanglements became so complicated that our narrow nationalistic economic policy cut off the nose to spite the face. A high tariff was an absurdity when, to keep out foreign sellers, it kept out the goods with which American manufacturers were paid for what they sold to foreign buyers. A law favoring domestic meat-packers hurt American meat-packers in Argentina; a rule discriminating in favor of American merchant ships hurt American owners of the German merchant marine; a tariff against Canada was protested by the Americans who controlled one-third of Canadian industry.

Possibly any foreign policy is workable if public opinion accepts it, abides by it, and is willing to pay the costs. Isolationism is a bad policy mostly because it requires sacrifices which we are unwilling to make. In our present world position, the enforcement of fool-proof isolationism requires these measures. (Of course we will not fulfil them.)

1. We must change into a militaristic nation, furnished with a two-ocean Navy large enough to defend our coasts against any possible combination of powers, supplied with a large army always at top equipment, and backed with a reserve for which every person has previously been trained. As a consequence, we must be willing to live in a very different "American Way." A

huge portion of our natural and human resources will then be always "wasted" in military strength.

2. We must not risk being "good" neighbors. None of our hemispheric neighbors must be allowed to develop commitments or connections abroad. To be sure of this, we had better seize the Caribbean republics, reduce South America to vassalage, wrench Canada out of the British Commonwealth of Nations and bind her, willy nilly, into the new "Pax Americanus."

3. We must develop Spartan virtues, for we will live less comfortably. No longer may we expect to sell our surplus industrial and agricultural products in the best markets abroad. We should not buy abroad what we lack at home, for no American group must become involved in the affairs of international business outside our lesser half of the globe. We must not import anything that we can not produce at home lest that make us part of the earth's interdependency which it is our policy to avoid.

4. To be sure of ourselves we had best make ourselves illiterate. This it will be easy to do: a society sufficiently regimented for the preceding planks of our platform will be completely under the control of the state. As long as our citizens read, they are likely to read European biography, history, novels, and poetry. They are sure to become interested in Europe's affairs and to permit their feelings to be enlisted on one side or the other. This has been a weakness of American public opinion in the past. From these western bleachers we have rooted for Greek Christians against the Sultan, cheered Hungarian republicans versus Hapsburgs, booed the slaughtering of Jews, sympathized with the underdog Boers, and signed

up for the Spanish Communist team that was lined up against European totalitarianism.

If we will place these restrictions upon ourselves, pay the penalty in less prosperity, and abide by the curb on our freedom it requires, then isolationism might work for some time—work until some future Admiral Perry from Asia, Africa, or Europe knocked down our guard and found us a push-over for any nation with the vigor to attempt it.

There is, of course, this danger in every "ism," that it determine policy too long after the conditions that justified it have passed away. There was a time when diseases were treated by "isms," not according to the diagnosis in every case. The fallaciousness of the old method is equally brutal when used in human relations. Any geo-political "ism" which purports to be a permanent scheme for intelligent national or international organization is suspect. Geography is not static. For example, the human environment in the United States promises to remain mobile for a long time. Automobile tourists in vacation time, or those mass travelers convention-bound, symbolize the steady displacement that affects millions of our population. The country-to-city migration in the United States is not yet completed, for the technological reasons which caused it have not yet run their course. As the laying of railroad lines during the nineteenth century often drew away the inhabitants of a river town which was passed by, so the new geography created

by hard roads alters the population pattern previously formed by the rail network. The redistribution that will be affected by greatly enlarged air transportation is even less predictable. Most certainly the end of the present war will leave us many new problems resulting from the tremendous migration of war workers. San Diego, California, for example, in 1940 increased from two hundred thousand to three hundred thousand. During the early months of 1942 the number of American families moving household goods had increased fifty per cent over a corresponding period in the year preceding.

Just as the search for bonanzas and eldorados kept our population unstable in the past, so the exploitation of natural resources may keep us moving in the future. A possible, if fanciful, chain of migrations might occur as follows. Long before our coal reserves are exhausted some of the veins will be mined at greater cost, for British experience indicates that technological improvements can not indefinitely keep mining costs down. Then it will pay to develop more of our available water-power, even when it is located in areas now remote from markets and population centers. A movement of people may therefore result to some place in the Rocky Mountains now not populated at all. At the same time, or later, when the potential hydro-electric power is nearly all in use, there will be a migration to the fuel deposits of Alaska. Eventually, we may turn to the tropics where motors will be turned in arid places by the energy of

the sun's rays, or engines operated on the islands of the Caribbean by the power stored in warm ocean waters.

Of course, we may stay where we are and let the farmers grow our fuel supplies. The chemists may do the trick for us. The meaning of our geography is already being changed in the laboratory. This is one of the most exciting features of the age in which we live. We have grown so accustomed to physical miracles that they no longer stir our conditioned reflexes, but the next decade may nonetheless bring a number of chemical discoveries with unimaginable consequences for our way of life. The shackled energy of the atom may be released; the non-utilized energy of the sun, the restless flow of the tides, the persisting power of the wind may be put to work.

Less fanciful—almost assured, in fact—is the rise of chemistry in the homely, simpler things of daily life. Already this new chemurgy has given us rayon, nylon, plastics, and a great number of other substances. Many of these are important in any inventory of our natural resources, for they derive from renewable materials and not from materials which can not be replaced. The chemist is filling a new cupboard with fresh things made of raw stuff which is grown, not mined. Laboratory wizardry is transforming the farmers' crops into a wide variety of industrial products.

Henry Ford excited the public during the Chicago World's Fair by displaying automobile fittings made

of plastics from soy-beans. Since then production of soy-beans has multiplied more than ten times. Their introduction was facilitated by the necessity for a multiple-purpose crop to replace oats, no longer needed in large amounts because of the tremendous decrease in horse population. Soy-beans are excellent because they are a legume which supplies nitrogen to the soil; they reduce soil erosion, they supply oils for a variety of uses, and they are of general value as feed after the oil has been extracted. Careful research by federal plant breeders has developed new varieties of soy-beans which possess the uniform special qualities so much desired by industrial users. Unfortunately, the soy-beans compete with cottonseed, which is also used for cattle feed after the oil has been squeezed out.

Many a housewife uses cottonseed oil (Wesson) or corn oil (Mazola) for summer salads, and Crisco, Dextro, or Spry for cake shortening without realizing that they are symbolic of a new era in crop usage. Part of this expansion has come because of private search for new derivatives. Much of it hinges on research by federal chemists to relieve the impact of technology on the farmer. For example, the rise of rayon, most of it made from wood pulp, has reduced the demand for cotton, with consequent hardship to the cotton grower. With silk eliminated from the market, and nylon still expensive to manufacture, use of rayon should increase. Some desirable grades of rayon are also produced from cotton fibers.

Their use should increase even faster in the next few years if laboratory experiments can refine production methods to insure uniformity and low price. The farmer would benefit from this new technology even as he suffered from the old.

A federal program calculated to assist agriculture in meeting the impact of this new chemurgy was crystallized recently by the establishment of four regional research laboratories, operating in the west, south, middle-east, and central states. Each devotes its entire attention to increased utilization of crop materials native to its region. All now devote their entire attention to products which may be useful in the current war effort. As an example, the laboratory at Peoria, Illinois, is studying possible uses of corn and wheat, soy-beans, and such agricultural residues as corn stalks, straw, and corncobs. During the summer of 1942, the two hundred scientists employed there made two discoveries which may be highly useful in meeting the critical demand for synthetic rubber. One of the processes, now operating on a semi-commercial scale, yields an alcohol-like liquid (butylene glycol) from fermentation of corn or wheat to replace alcohol; it also has several other commercial applications in war industries. Laboratory experiments have already shown that this liquid may be changed to butadiene, a substance which yields synthetic rubber; it remains only to enlarge the process to industrial proportions. Meanwhile, the laboratory has demonstrated details of the new

process to the industry, and it will soon be operating on a commercial scale.

Any rubber-like substance, even if it lacks all the properties of true rubber, may be of vital national importance. Experiments with soy-bean oil at the same laboratory have produced Norepol, a material with all the superficial qualities of rubber. It has one-third the stretching ability of natural rubber and only one-sixth its stretching strength. But if Norepol could be produced commercially, it would supply a demand for uses where stretching ability is unnecessary, and release the natural or synthetic rubbers for more exacting tasks.

A third product scheduled for wide agricultural production is natural rubber from the guayule shrub. Although known for years, this native American plant has been essentially ignored except for one small experimental plot in California. Now that we face a rubber crisis, guayule plantings will be vastly expanded under government supervision. Continuous growth throughout twelve months of the year in the Southwestern States should insure a yield within two years. Meanwhile, new processes of extraction and fabrication are undergoing experiment.

American farmers will also plant large acreages of the hemp plant this year in the Central States. Most of our hemp came previously from the Far East. Now we must produce our own.

The examples detailed above are all unusual, and a response to abnormal conditions. These excep-

tional discoveries are in addition to a broad field of knowledge and research which promises to yield enormous dividends in the peaceful future. A Negro scientist working in the chemical laboratory of a southern Negro college has already revolutionized the use of the lowly peanut. Soy-beans have opened such a wholly new perspective of use that some enthusiasts already envisage plastic automobile bodies of the future which can be grown on the flat farms of the Central States. Special glues, waterproofing, and paper-treating solutions are also an outgrowth of soy-bean research. Casein from milk has similar uses and has even been used in the production of textile fibers which can be interwoven with wool or cotton. Corn, already an industrial giant with breakfast cereal, cooking oil, puddings, starches, and glucose syrups to its credit, likewise has many future uses, not only for the kernel but also for the cobs and stalks.

This ingenuity with which man reinterprets the meaning of his physical environment revives the hope that we may also become wiser in understanding the human features of our habitat. Something like the honest devotion to truth and habitual tolerance of criticism which transmuted white magic into chemistry must characterize the treatment of social relations. Only thus can we repress our suicidal racial prejudices, national passions, and economic feuds. There is one liberty for which we must always fight, the freedom to be intelligent.

Always, it seems, one begins to look for a national destiny by peering at the far places and ends by observing the pinch of dust, the blade of grass, the pebble, or perhaps the bakelite knob, the rubber band, the bit of string in one's fingers. The future is still elusive as fate, but the problems of the here and now and the perplexities of the past need not escape us. And there is no reason to fear that the next few years of the unknown will be so much stranger than the last years of the knowable. Faith in these remains: the whirling winds, the pressing rocks, the warming sun, the rushing waters—without mercy, but without malice.

Index

- Agriculture, on small farms, 78; on the prairie, 80-81; farm tenancy, 166; on irrigated lands, 177; affected by recent chemical research, 233-236. *See also* Soil; Reclamation.
- Atlantic Ocean, winds and currents, 38-41
- Blue Grass region, 56
- Boone, Daniel, 57, 68
- Boulder Dam, contrast with TVA, 189-190, 193-194; and Imperial Valley, 190-191, 193; description and construction, 191-193
- Boundaries, at close of Revolution, 64-66; of Texas, 74; at close of Mexican War, 75; mathematical character of, in U. S., 195-197; interstate border wars, 198; of Maine, 200; west of Lake Superior, 201-202, 204-205; supervision of, with Canada, by International Commission, 205-206; with Mexico, 206-209
- California, New England trade with, 94; overland migration to, 106-107; gold rush, 107-108; communications with East, 109-112
- Canada, boundaries, 1, 199-206; glaciation, 1; invasion of, in 1812, 69
- Central Pacific Railroad, 114-115
- Chemistry, production of substitutes for mineral resources, 233-236
- China, opening of American trade with, 92-93
- Climate, of Texas, 74; of land ceded by Mexico, 74-75; of Great Plains, 166, 171-172; of Illinois, 170; variability in U. S., 171-172
- Coal, origin, 22, 135-137; rôle in American history, 137-138; uses, 138-139; economic conditions, 139-142; waste, 142; reserves, 142-143
- Coastal Plain, 70-71
- Colorado River. *See* Boulder Dam.

- Columbia River, discovery of, 92; and Oregon Trail, 102
 Compromise of 1850, 109
 Comstock Lode, 145-147
 Conservation, of petroleum, 131-133; of coal, 139-143; of soil, 159-167. *See also* Reclamation.
 Copper, Lake Superior deposits, 148-149; Bingham Mine, 149-150
 Corn, origin, 10; uses, 12
 Cotton, 30; expansion of culture of, 70-74
 Cotton Belt, 30
 Cumberland Gap, 56, 57, 66
 Currents, Atlantic, 38-41
- Douglas, Stephen A., 111, 112, 114
- Erie Canal, 82-83
 Erosion, 159-165, 169
- Floods. *See* River control.
 Florida, purchase of, 68
 Foreign affairs, in a democracy, 224
 Forests, original extent of, 80; destruction of, 80, 118-119; farming in, 81
 French, in America, 53, 61
 Frontier, Kentucky, Tennessee, and Missouri, 56-59, 66-67; Ohio, Indiana, and Illinois, 78; disappearance of, 152-153; life on, 156-157; Red River settlement, 203
 Fur trade, Pacific coast, 92-95; Hudson's Bay Company, 96, 97, 105, 108; in the Northwest, 96; Russian, 96
- Gadsden Purchase, 110
 German immigration, 87
 Glaciation, during Ice Age, 1-9; loess, 4; duration and time elapsed since, 6; spillways from Great Lakes and historical significance, 14; in Mohawk Valley, 82; effect on Canadian Shield, 202-203. *See also* Great Lakes.
 Gold, discovery in California, 143-144; rôle in western settlement, 144-145; Comstock Lode, 145-147; present production, 148
 Granite, age and origin, 18-19
 Great Britain, immigration from, 87-88; and Monroe Doctrine, 210, 211
 Great Lakes, glacial history, 5; ore deposits of, 19; transportation on, 29; War of 1812, 69; and Erie Canal, 82-83. *See also* Glaciation.
 Great Plains, Indians removed to, 98; climate,

- Great Plains (*cont'd*)
171-172; cattle business,
173-175
- Great Valley of the Appala-
chians (Great Limestone
Valley), origin and de-
scription, 15, 21; migration
down, 57
- Hawaiian Islands, early
American shipping, 91;
early American interest in,
93-94; annexation, 215;
strategic significance, 216-
217
- Homestead Law, 166
- Hudson's Bay Company, con-
trol of Western Canada,
204. *See also* Fur trade.
- Immigration, reasons for, 59-
62; increase after 1815,
85; avoidance of South,
86-87; German, 87; Brit-
ish, 87-88; reduction after
World War I, 219-220
- Imperial Valley, and Boulder
Dam, 190-191, 193
- Indians, Maya, 9; in West
Indies, 46; Iroquois, 52;
defeat at Tippecanoe, 70;
War of 1812, 70; removal
of, to Great Plains, 98; on
the Great Plains, 172-173
- Industrial Revolution in U.
S., early demands, 120
- International Commission,
boundary supervision by,
205-206
- International trade, 228-229.
See also China, Latin
America, etc.
- Iron, origin of ores, 16, 22,
123; rôle in industry, 121;
Lake Superior deposits dis-
covered, 122; methods of
mining in Mesabi Range,
124; future, 125-126
- Iroquois, 52
- Isolationism, 224-225, 229-
231
- Japan, Perry expedition to,
108
- Kansas-Nebraska Territories,
controversy over, 112-114
- Latin-America, contrasts with
Anglo-America, 208-209;
relations under Monroe
Doctrine, 211-213; Good
Neighbor Policy with,
213; improvement of rela-
tions with, 222-223
- Lincoln, Abraham, 59, 75
- Local government, geograph-
ically obsolete, 225
- Long Island, glaciation, 2
- Louisiana Purchase, 68
- Maumee River, 70
- Maya, 9

- Mexican War, 107
Mexico, boundaries, 206-209
Mineral resources, 151-153
Mississippi River, source of, 201
Missouri River, glaciation, 2
Mohawk Valley, 82
Monroe Doctrine, origin and development of, 209-210; Great Britain and, 210, 211; effect of, 210-211; Good Neighbor Policy, 213

Nashville Basin, 56
Nationalism, 87-89, 222
Negroes, slavery and slave trade, 47-48; race relations, 222-223
New England, glaciation, 4; industry, 28; migration from, 82-84; effect of Erie Canal on, 83; trade with China, 91-94; hide trade with California, 94

Ohio River, glaciation, 2; shipping on, 76-78, 183-184; floods in, 183-184
Oregon, fur trading, 92, 97; joint occupation of, 97; missionaries in, 97; acquisition by U. S., 105-106; overland migration to, 97-105; geography of, 98-102; climate and geography, 103

Oregon Trail, 99-102
Ores, flotation process, 150.
See also Copper; Gold; Iron; Silver.

Pacific Coast, beginning of settlement, 90-91; fur trade, 92-95; development of whaling industry, 93
Pacific Ocean, American interests in, 214-216
Petroleum, origin, 24, 130; first oil well in U. S., 126-127; rapid exhaustion of wells, 128; distribution and production in U. S., 130; waste of, 131-132; future supplies, 134
Philippine Islands, 215-217
Population, increase in America, 62-63; movement westward, 78, 97-105, 143-145; urbanization, 154-155; present tendencies and their implications, 219-221; distribution around Pacific, 221-222; continued mobility of, 231-232
Prairies, character and explanation of, 79-80
Public Land Policy, 197-198

Reclamation, reasons for, 175-176; advantages and disadvantages, 176-177; effect on dietary habits, 177-179

- Red River settlement, 203
- Regionalism, as basis for improved federalism, 226-227
- River control, Miami project, 182-183; Ohio River, 183-184. *See also* Boulder Dam; Tennessee Valley Authority.
- Silver, Comstock Lode, 145-147; present production, 148
- Soil, normal removal, 159; erosion, 159-165; depletion of, 162-163; conservation of, 166-167; erosion and hydro-electric reservoirs, 169; silting of streams, 180-182
- South America. *See* Latin America.
- South Pass, location and discovery of, 95-96; description of, 100
- Spain, Cortez, 12; New World empire, 45; influence on ranching, 173-174
- Sugar, West Indies plantations, 48; and U. S. relations with Cuba, 212
- Tennessee Valley Authority, purpose and scope, 184-187; significance, 187-189
- Texas, boundaries, 74; climate, 74; Mexican War, 75
- Transportation, early shipyards at Pittsburgh, 76; river steamboats, 77-78; canal construction, 82-84; controversy over transcontinental railroad routes, 109-111; construction of Union Pacific and Central Pacific railroads, 114-115; changes in after Civil War, 120-121
- Union Pacific Railroad, 114-115
- Wabash River, 70
- War of 1812, 68-69
- Water, and soil erosion, 168-169; uses of, 170; geologic behavior, 179-180; silting of streams, 169, 180-182; rights on Rio Grande and Colorado Rivers, 207-208; floods: *See* River control.
- Wegener, Alfred, 35
- West Indies, location, 43; natives, 46; slave labor, 48; relation to U. S., 212
- Whaling, on Pacific Coast, 93
- Wilderness Trail, 58, 66
- Willamette Valley, 104, 109
- Winds and currents, Atlantic, 38-41

Years of This Land

A Geographical History of the United States

By HERMANN R. MUELDER
and DAVID M. DELO

The purpose of this book is to present significant facts about the United States in such a way as to make them seem part of the good earth under our feet. In a stimulating manner, the authors plausibly relate our history to the soil, sand, rocks, wind, water and rain, grass and trees, bread and butter of real life.

Here is our national story freed from a mere chronicling of dates and battles; written to revitalize the reader's interest in his land. It views American history as the march of men across the earth, the resources they discovered, and the part those minerals, soil, water, and forests played in the conquest of a continent and the expansion of a maturing nation. The book clarifies the definite reasons why men came as they did and when they did to America. It shows how the pioneers spread across the country as they migrated inland from the oceans; why the nation rose to continental stature in so short a period.

Realistic planning for the future can come only from knowledge of the past. Readers of this book will find the past so exciting that they will feel more keenly their stake in the present, thus stimulating that clarity of thought and boldness of action so vital to our future.

HERMANN R. MUELDER
and
DAVID M. DELO

Dr. Muelder is Professor of History and Government at Knox College, and Dr. Delo is Professor of Geology at the same institution. Participation of the authors in offering a course at Knox called "The Middle West" led to a realization of the close relation between geographic circumstances and historical events. They came to the conclusion that, if college students knew so little of this aspect of America's development, the lack of comprehension of the average citizen, separated from college by many years, must be even greater. To remedy this situation and to free the subject from the customary impediment of a college course, they have written "Years of This Land."

Dr. Muelder was educated at Knox, and the University of Minnesota, where he obtained his Ph.D. He has been teaching history at Knox since 1934. His specialty is the development of frontier institutions. He is the author of "A Puritan College in the Middle West," and has contributed to many historical journals.

Dr. Delo is a graduate of Miami University, and obtained his Ph.D. from Harvard. He has been teaching at Knox since 1937. He has contributed scientific articles to geological journals as well as to newspapers.

UNIVERSAL
LIBRARY



126 452

UNIVERSAL
LIBRARY